ENVIRONMENTAL FATE AND EFFECTS DIVISION

SCIENCE CHAPTER

FOR

REREGISTRATION ELIGIBILITY DOCUMENT

FOR

PROPARGITE

Brian Montague, Biologist /Team Leader
Richard Mahler, Ph.D., Chemist
Secondary Review: Kevin Costello
Arnet Jones, Chief Environmental Risk Branch I
Environmental Fate and Effects Division, 7507C
Environmental Fate and Effects Division
Office of Pesticide Programs

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ENVIRONMENTAL RISK CONCLUSIONS

Ecological Effects
EFED's assessment suggests that the most significant ecological risk posed by the use of propargite is the potential for adverse effects on reproduction in birds and mammals. EFED's standard method for assessing risk uses an estimated residue concentrations in water or on food items divided by a toxicity value from a laboratory study in which birds, mammals, fish or aquatic invertebrates have been exposed to the pesticide. *The assessment indicates that reproduction risk to birds may occur where propargite is applied a single time at 0.5 lb active ingredient per acre (ai/A) or greater, a rate which is allowed by virtually all labeled uses of propargite. Concerns for reproduction risk to mammals are triggered at application rates of 1.6 lb ai/A or greater. These concerns are heightened when multiple applications of propargite, which are allowed by most labels, are factored into the assessment.* Multiple applications of a pesticide can increase organisms' exposure by increasing the concentration of residues on food items and also by extending the period during which these residues may be present. (Although labels do not specify a minimum interval between applications, the EFED assessment assumed a 7-day interval). The timing of propargite applications to control target pests may coincide with breeding seasons of some birds present in application areas and could expose nesting birds and their developing young. EFED's conclusions for propargite's potential effects to birds and mammals are based on the following labeled rates and numbers of applications: 2 applications at 4.5 lb ai/A; 2 applications at 3 lb ai/A; 2 applications at 2 lb ai/A; and 2 and 3 applications at 1.6 lb ai/A.

The assessment suggests concern for acute effects to birds and mammals for multiple applications of propargite at the highest labeled rate of 4.5 lb ai/A (walnut, avocado, and almond). Also, warnings on labels indicate that propargite is corrosive and that sprays can be hazardous to humans and domestic animals through dermal contact or inhalation. Although EFED's assessment does not consider these specific exposure routes, it follows that similar acute hazard exists for wildlife exposed to propargite spray.

The EFED assessment suggests that risk to aquatic organisms and plants is generally lower than the risk for birds and mammals. However, the standard method for assessing aquatic risk results in concern for potential chronic effects to freshwater fish and invertebrates. Although EFED's criteria for acute risk to freshwater invertebrates and estuarine fish were not exceeded, the assessment suggests that adverse effects could occur in shallow bodies of water that are not represented by standard scenarios. No data are available to assess chronic risk to estuarine and marine organisms. EFED's criteria for restricted use and endangered species are exceeded for most classes of terrestrial and aquatic organisms (Table 1).

More detailed analyses of the potential ecological effects of propargite are presented later in this document.

Table 1. **Risk Presumptions Predicted by One or More Labeled Uses of Propargite**

Level of Concern Exceeded by Propargite Label Uses	Acute Risk	Restricted Use	Endangered Species	Chronic Risk
mammals	yes*	yes	yes	yes
birds	yes**	yes	yes	yes
non-target insects	no	NA	yes-spiders	NA
freshwater fish	no	yes	yes	yes
estuarine fish	yes	yes	yes	no data
freshwater invertebrates	no***	yes	yes	yes
estuarine invertebrates	no***	yes	yes	no data
terrestrial plants	no	NA	yes	yes (necrosis)
aquatic plants	yes	NA	NA	NA

* Rates $\geq$ 3.0 x 2 applications (walnuts, citrus, avocados, almonds, cherries)
** Rates of 4.5 lb ai/A applied twice (walnuts, citrus, avocados, almonds)
*** Levels of concern were approached in the standard scenario and could be exceeded in shallow aquatic systems or those with watershed drainage > 10 hectares.

Use and Usage
Propargite is a non systemic miticide/acaricide manufactured and distributed by Uniroyal Chemical Company. Propargite's estimated usage on 1.5 to 2.1 million acres of agricultural land in the United States is focused primarily in states west of the Rocky Mountains. Exceptions are usage on cotton in the south and southwest and on peanuts and citrus in the southeastern U.S. In addition, propargite is registered for use on non-bearing fruit trees in the northeast, but recent data provided to EFED indicate that this is not an significant use pattern.

Environmental Fate and Transport
Propargite is moderately persistent on soils and in aquatic environments (laboratory half-lives were 38-168 days) and relatively non-mobile (K_{oc}s.were 2963 - 57966 mL/g). Initial off-target transport is expected to be through drift from aerial, airblast, and ground boom applications and later through erosion and runoff of soil particles to which propargite is adsorbed. Surface water Tier II modeling predicted a peak surface water concentration of 26 ug/L. Surface water Tier II modeling with index reservoir and percent crop area factor predicted a peak surface water concentration of 34 ug/L. Surface water monitoring showed a peak concentration of 20 ug/L; while time weighted averaging of the monitoring data showed a maximum concentration of 1.24 ug/L. SCI-GROW simulations predicted a ground water concentration of 0.006 ug/L.

Additional Data Needs
Based on EFED’s determination of the moderate persistence of propargite in aquatic habitats, its high acute toxicity to estuarine organisms, and potential off-site transport to estuarine areas

through drift or runoff, EFED requests that the registrant provide the following studies:

- Chronic Life-cycle Estuarine Invertebrate and
- Early Life Stage for Estuarine Fish (Guideline 72-4)

Spray drift data (Guideline 201-1 and 202-1) have not been submitted, but it is likely that these data requirements can be satisfied through the registrant's membership in the Spray Drift Task Force.

The full fish life cycle study (72-5) is held in reserve. This study, requested to support aquatic crop uses (cranberries), was submitted and found to be invalid. However, in 1998 the registrant dropped the cranberry use from present labels and these data are not needed to support the uses assessed for the RED.

INTRODUCTION

This document summarizes the EFED environmental risk assessment for propargite registration as an acaricide/miticide on terrestrial food crops and ornamentals.

Mode of Action on Target Organisms
Propargite (OMITE, COMITE, and ORNAMITE), is an organosulfite chemical which functions acutely on contact with larval and adult mites and displays limited ovicidal activity. Mite resistance to propargite is considered unstable and short-lived. Propargite maybe somewhat species specific as far as the acarids it does control (about 20 target species are listed on labels).

Use Characterization
Propargite is a non systemic acaricide with estimated usage on 1.5 to 2.1 million acres of agricultural land in the United States. Primary usage is concentrated in states west of the Rocky Mountains (based on the 1999 Quantitative Usage Assessment(QUA) report prepared by the Agency). However, propargite is also used on cotton in the south to southwest and on citrus and peanuts in the southeastern U.S. In addition, usage on non-bearing fruit trees could occur in the northeast, but recently has not, based on 1997 and 1998 sales and usage patterns.

Types of formulations supported by the registrant:

Omite 30W and WS (water soluble bags, wettable powder)	32% ai
Omite 6E and Comite II(emulsifiable concentrates)	69.2% ai
Comite (emulsifiable concentrate)	73.6% ai
Ornamite (wettable powder) use on ornamentals only	32% ai

Application Methods: Ground-air blast, Ground spray-boom, aerial (fixed wing or helicopter), chemigation, or hand-held high pressure gun.

Use Patterns

Bearing Crop Usage: Almonds, Grapes, Nectarines, Ornamentals, Peanuts, Walnuts, Hops, Lemons, Oranges, Grapefruit, Field/Pop/Sweet Corn, Mint, Potatoes, Dry beans(incl. Lima), Cotton, Sorghum, Jojoba

Non-Bearing Crop Usage: Strawberries, other Berries, Citrus, Currants, Dates, Figs, Nut trees, Persimmons, Fruit Trees (apples, plums, prunes, apricots, cranberries, pears, peaches).

Post-Harvest Usage: Cherries, Grapefruit, Navel Oranges,

Section 24 Usage: Commercial Roses(CA), Avocados (CA), Conifers (OR, WA), Alfalfa -seed crops (CA, ID, MT, NV, OR, UT, WA, WY), Carrots for seed (ID, OR, WA), Clover for seed(ID, OR, WA), Mint (ID, MT, NV, OR, UT, WA),

Table 2. Propargite Methods, Rates, and Expected Times of Application, and Primary Geographical Locations and Maximum Expected Acreage for Potential Exposure
(Based on registrant provided information,1998 labels, and 1999 QUA report (USEPA))

Crops	**Primary Exposure Area (over 80%use)**	**Max. Use Acres**	**Season when applied**	**Method and # of Applications-*No intervals specified**	**Rate Range in lb ai/A**
Alfalfa for seed	CA, ID, NV, MT, OR, UT, WA, WY	74,000	Summer	Ground & Aerial 1 application	1.2 to 2.4
Almonds	CA, AZ	256,000	Late Spring	Ground & Aerial 2 Ground, 1 Aerial	1.5 to 3.0
Nonbearing Pecan, Almond and Walnut	CA	97,000	Mid Summer	Ground and Aerial x 2 or 3 (x 1.6 lb ai/A)	1.6 to 4.5
Dry Beans	West	180,000	Late Summer	Ground or Aerial x 2	1.6 to 2.7
Citrus	FL, TX	73,000	Fall (FL)	Ground or Aerial x 2	1.6 to 3.0
	CA, AZ		Spring & Fall	Ground or Aerial x 2	2.3 to 4.5
Field and Pop Corn	CA, AZ, KS, TX, NM, CO	504,000	Late Summer to Fall	Ground Chemigation, or Aerial x 1 or 2	1.6 to 2.5
Sweet Corn	CA, ID, OR, WA, CO, KS	7,300	Summer	Ground or Aerial x 1 or 2 applications	1.6 to 2.4
Cotton	CA, AZ	372,000	Summer	Ground, Aerial, ULV 3 applications	0.8 to 1.6
	Southern states		Summer		
Grapes	West of Rocky Mountains.	250,000	Spring Early summer	Ground	1.5 to 2.7
Hops	WA ,OR	32,000	Summer	Ground or aerial x 2	1.5 to 2.3
Mint	ID, MT, NV, UT, WA, OR	26,000	Summer	Ground or Aerial x 2	1.5 to 2.3

Nectarines	CA, FL	21,000	Summer	Ground or Aerial x 2	1.5 to 2.7
Peanuts	AL, VA, SC, NC, GA	46,000	Late summer	Ground or Aerial x 2	0.9 to 1.6
Berry Crops	Nationwide	18,000	Entire season	Ground x 2	2.0
Conifer Tree - Woodland use	OR, WA	248,000	Summer	Ground or aerial x 3	2.2
Cherries-post harvest	Western	19,000	Summer	Ground and Aerial	1.8 to 3.2
Clover for seed	ID, WA, OR	No esti-mate	Summer	Ground or Aerial x 1	1.6 to 2.4
Potatoes	WA, OR, ID	84,000	Summer	Ground or Aerial x 2	1.2 to 2.0
Sorghum	CA, AZ, TX , East of Rockies	44,000	Summer	Ground or Aerial x 1	1.2 to 1.6
Ornamentals Commercial	FL, CA, OR, WA	No esti-mate	Spring-Summer	Ground	1.0/gal spray
Sugar beets-seed	OR	3,000		Aerial x 2	1.6 to 2.4
Carrots for seed	ID ,WA, OR	2,000		Ground x 1	1.6
Avocados	CA	6,000		Ground x 2	3.0 to 4.5
Other minor crops on labels:,currants, dates, persimmons, other tree fruit, macadamia, pecan, pistachio, hazelnut, jojoba					

ENVIRONMENTAL FATE AND TRANSPORT ASSESSMENT

Chemical Profile

Common Name: Propargite
Chemical Name: 2-[4-(1,1-dimethylethyl)phenoxy]cyclohexyl 2-propynyl sulfite
Class: Organo-sulfite
Physical/Chemical Properties:
- Molecular Formula: $C_{19}H_{26}SO_4$
- Molecular Weight: 350.5 g/mole
- Physical State: light to dark brown viscous liquid
- Vapor Pressure: 4.49×10^{-8} torr
- Water Solubility: 0.63 mg/L @ 25 ^{0}C
- Henry's Law Constant: 3.28×10^{-8} atm m^3/mol
- Log K_{ow}: 5.8
- CAS Number: 2312-35-8

Environmental Fate Assessment Summary

Propargite is moderately persistent (metabolism half-lives = 38-168 days) and immobile (K_ds ranged from 60 to 218 mL/g, while K_{oc}s ranged from 2963 to 57966 mL/g) . It degrades rapidly under alkaline hydrolytic conditions (half-life = 2.2 days) and is moderately persistent to persistent under neutral (half-lives = 75 days) and acid (pH 5 half-life = 120 days) hydrolytic conditions. Soil and aquatic photolysis and aerobic and anaerobic metabolism occur at moderate rates (half-lives = 39-168 days). Degradates are carbon dioxide, propargite glycol ether (TBPC, 2-[4-(1,1-dimethylethyl) phenoxy] cyclohexane-1-ol, also identified as 2-(p-tertiarybutyl phenoxycyclohexanol and PTBP (p-tertiary butylphenoxy cyclohexanol (see Appendix 1 for structures). Because of its high affinity for soil and sediment, propargite has the potential to move off the site of application during rainfall/irrigation by erosion/runoff on soil particles and by drift. Given the moderate to slow degradation rates for metabolism and photolysis, and the high K_{oc} values, propargite will probably be adsorbed to sediments and organic material if transported to surface waters.

Hydrolysis

Propargite hydrolyzes rapidly under alkaline (pH 9 half-life = 2.2 days), slowly under neutral (half-life = 75 days) and is stable in acidic conditions (pH 5 half-life = 120 days). Propargite glycol ether (TBPC, see Appendices for structure), the alcohol glycol ether hydrolysis product of propargite, was the major degradate detected which was present at maximum concentrations of 7.8, 37, and 88% of applied in the pH 5, 7 and 9 studies, respectively. The data requirement is fulfilled (Nowakowski, 1987, MRID 40358401)

Aqueous Photolysis

Aqueous photolysis does not appear to be a significant mode of degradation since there were little differences between light exposed and non-exposed samples. Aqueous photolysis half-lives of 134 and 140 days were reported for propargite when pH 5 buffered test solutions were exposed to a xenon arc lamp light source. TBPC and PTBP at maximum concentrations of 7.3 and 13 %, respectively, were the only reported photolysis degradates detected in the study. The data requirement is fulfilled (Nowakowski, 1987, MRID 40354802)

Soil Photolysis

Soil photolysis does not appear to be a significant route of dissipation for propargite. Propargite degraded with registrant calculated half-lives (dark control corrected) of 63 days (12 hours light/12 hours dark) on sterilized sandy clay loam soil (pH 6.9) and 91 days on unsterilized sandy loam soil that was exposed to a continuous light source at 25 ^{o}C. The half-life in the dark control was 113 days. TBPC reached a maximum concentration of 20.8% of applied radioactivity in the light exposed test samples and a maximum of 15.6% of applied in the dark control test samples during the study. Soil bound residues reached a maximum concentration of 6.3% and volatile compounds were <1% of applied radioactivity. The data requirement is fulfilled. (Nowakowski, 1987, MRID 4038402, Kirpalski,1988 and 1990, MRID 42319301, 42319307)

Aerobic Soil Metabolism

Radiolabelled propargite, at 6.0 µg/g, had a first order half-life of 168 days (r^2=0.92) in a sandy loam soil (pH=6.6) when incubated under aerobic conditions at 25°C. The study authors reported biphasic degradation curves.   The initial rapid half-life (0 to 59 days post-treatment) was 67 days (R^2 = 0.98) and the second phase (59 to 365 days post-treatment) half-life was approximately 231 days (R^2 = 0.99). However, EFED believes that linear regression of time vs. natural logarithm of concentration, which is EFED's conventional method of determining a half-life, adequately describes the degradation kinetics of propargite in aerobic soil.

Nine metabolites were detected during the testing period. Metabolites identified were the sulfate derivative of TBPC (MET-8, maximum concentration of 7.62% of applied) and TBPC (MET-3, maximum concentration of 1.98% of applied, see Appendices for structure). Carbon dioxide was detected at a maximum concentration of 32% of the applied radioactivity by the end of the study. Seven metabolites were detected in concentrations <0.65% of applied radioactivity. In addition, soil-bound radio-labeled residues (32.96% of applied radioactivity) were detected in soil organic matter (SOM) fractions. Propargite and TBPC were identified in SOM extracts in concentrations of 1.47 and 1.57% of applied radioactivity, respectively. The data requirement is fulfilled. (Comezoglu,1995, MRID 43851402)

Anaerobic Soil Metabolism

Anaerobic soil metabolism does not appear to be a significant degradation pathway for propargite. The half-life of propargite, incubated anaerobically for 60 days, was 64.4 days (r^2=0.99) in the pH 6.9 sandy clay loam soil used. TBPC was detected in soil and water extracts at maximum concentrations of 20.3 and 3.4% of applied radioactivity, respectively. PTBP was only detected in the water phase at a maximum concentration 0.7% applied radioactivity. Soil bound residues and CO_2 were at maximum concentrations of 14.9% and 2.7% of applied radioactivity. The data requirement is fulfilled. (Dzialo, 1988, MRID 41003602)

Anaerobic Aquatic Metabolism

Propargite degraded with a half-life of approximately 46.6 days (r^2=0.93) in flooded sand hydro-soil that was incubated in the dark at 25ºC under anaerobic conditions. Four degradates were identified: TBPC, 61.5%, (M1), PTBP, 1.57%, (M2), OMT-B, 2-[4-(1,1-dimethyl-2-hydroxyethyl)phenoxy] cyclohexane-1-ol, 4.7%, (M3), and BGES, bis-[2,-(4-(1,1-dimethyl-ethyl)-phenoxy)cyclohexyl]sulfite, 1.72%, (M8), Appendix 1). No other degradates were identified in the study. Only TBPC (61.5%) and OMT-B (4.7%) exceeded 2% of the applied in either the soil or aqueous phase. On day 270, TBPC reached a maximum 40.1% of the applied and OMT-B a maximum 4.1% of the applied test material in the aqueous phase; while in the soil phase, TBPC was 29.9%. Up to 5.14% of the applied was mineralized to CO_2 by 365 days, while approximately 25% became soil bound residues. The data requirement is fulfilled.(Comezoglu, 1993, MRID 43139401

Aerobic Aquatic Metabolism

Propargite degraded with a half-life of approximately 38 days (r^2=0.98) in flooded loam lake sediment (pH 5.5) that was incubated in the dark at 25ºC under aerobic conditions. Four degradates were identified: TBPC, PTBP, OMT-B [2,2-dimethyl-2-(4'-(2-hydroxy-cyclohexoxy)phenyl)ethanol], and TBPC-Acid (2-[4-(2-hydroxycyclohexoxy)phenyl]-2,2-dimethyl acetic acid). TBPC was detected at a maximum concentration of 27.7%; while the other degradates were detected at concentrations $\leq$1.54% of the applied radioactivity. While most of the applied radioactivity persisted as parent in the soil, degradates dominated the aqueous phase by 14 days post-treatment. At 30 days, unextracted residues and volatile compounds totaled 4.8 and 0.68% of applied radioactivity, respectively. The data requirement is fulfilled. (Comezoglu, 1993, MRID 42688801)

Mobility

In two separate batch equilibrium studies, propargite was immobile and propargite glycol ether (TBPC), the primary degradate of propargite, was determined to be mobile to very mobile in the six soils from California, Connecticut, Maryland, Mississippi, and Florida used in the batch equilibrium studies. The organic carbon partitioning coefficients (K_{oc}s) and K_ds for parent ranged from 2963 to 57966 mL/g and 60-218 mL/g, respectively, for the soils tested; while K_{oc}s and K_ds for TBPC ranged from 187-460 mL/g and 0.65-8.39 mL/g, respectively (see Table 3 below for details). The leaching, absorption/ desorption data requirement is fulfilled. (Spare, 1993, MRID 42908401, 4298402)

Table 3. Results of batch equilibrium study to estimate leaching of propargite residues .

Soil Location	Soil Texture	Propargite		TBPC	
		Kd-mL/g	**Koc-mL/g**	**Kd-mL/g**	**Koc-mL/g**
California	sandy loam	107	25918	1.17	284
Connecticut	loamy sand	92	2963	0.66	187
Maryland	sand	205	57966	0.65	551
Mississippi	clay	218	11929	6.7	215
Florida	sand	128	36205	1.47	418
Florida	sand sediment	60	50660	8..39	460

Terrestrial Field Dissipation

Five field dissipation studies were conducted on bare ground plots in California, and citrus and cotton plots in California and Florida using either emulsifiable concentrate, wettable powder, or a controlled release formulation of propargite applied 2 or 3 times at application rates ranging from 0.83 to 5.15 lb ai/A. Field dissipation half-lives were 67, 78, 87, 94, and 99 days.

In two acceptable studies conducted on citrus in Florida and California, propargite dissipated with half-lives of 67 and 87 days, respectively. In the Florida study, propargite was detected at a maximum concentration of 0.56 ppm in the 0-6 inch depth and decreased to $\leq$0.05 ppm by 151 days. Parent was not detected in any soil sample below the 0-6 inch depth. TBPC was <0.01 ppm (detection limit) in the soil at all depths and sampling intervals. In the California study, propargite was detected at a maximum concentration of 1.25 ppm in the 0-6 inch soil depth and decreased to $\leq$0.05 ppm by 190 days. Propargite was detected once in the 6-12-inch depth at 7 days (0.025 ppm), and was not detected in the 12-24 inch depth at any sampling interval. TBPC was detected at 0.019 to 0.113 ppm in the 0-6 inch depth in some of the replicates, but was not detected at any other soil depth. (Harned, 1989a, 1990, MRID 41307301, 41731501)

In one acceptable study conducted on cotton in California, propargite dissipated with a half-life of 94 days. Propargite was at a maximum of 0.54 ppm in the 0-6 inch depth and then decreased to $\leq$0.05 ppm by 283 days. TBPC was <0.10 ppm (detection limit) in the soil at all depths and sampling intervals, except one soil sample in the 0-6 inch depth that contained 0.10 ppm at 91 days. (Harned, 1989b, MRID 41325901).

In two acceptable studies conducted on bareground plots in California, propargite dissipated with half-lives of 78 and 99 days, respectively, in sandy clay loam and loamy sand soils. At the two sites, propargite was at a maximum concentration in the 0-6 inch soil depth of 2.2 and 5.3 ppm after the second application and then decreased to 0.14 ppm by 354 days. Propargite was not detected in any other soil depth at any sampling interval at concentrations $\geq$0.05 ppm. The degradate TBPC varied in concentration from a maximum of 0.30 to 0.35 ppm to 0.016 ppm by day 354, with no distinct pattern of formation or decline. TBPC was generally not detected (at concentrations $\geq$0.10 ppm) in soil samples collected below the 0-6 inch depth, except in one sample from both the 6-12 and 12-24 inch depth that contained 0.16 and 0.10 ppm, respectively, immediately and 73 days after application. (Lengen, 1989, MRID 40969501)

In all of the studies, factors contributing to the route of dissipation were never fully identified, but may include the degree of soil binding and subsequent runoff, and how favorable conditions were for microbial growth. These studies provide terrestrial dissipation information about a variety of soils. The data requirement is satisfied.

Non-Guideline Terrestrial Field Runoff and Spray Drift Monitoring Studies
Measured residue levels from six monitoring studies indicate that propargite may drift and runoff in relatively large quantities under the conditions that existed during the time the studies were conducted. A total of six terrestrial field runoff monitoring studies were conducted on corn (Missouri, Texas), cotton (two in Georgia) and oranges (two in Florida). The studies were situated so that the crops (5.3 to 52 acres) were planted around irrigation ponds ranging from 0.43 to 3 acres so that any runoff (monitored by determining propargite concentration in pond water and/or in runoff water occurring after irrigation or rain) or spray drift (monitored with drift cards) that occurred was carried to the ponds. Total propargite applications ranged from 1.64 to 5.0 lb ai/A and were applied aerially.

Spray drift card analysis showed that significant amounts of applied propargite residues reached the pond waters through drift. The studies were conducted to allow spray drift to reach the ponds in order to measure the dissipation of propargite from pond water and sediment. Pond water showed propargite residues ranging in concentrations from <5.0 to 120 ug/L (ug/L); while the degradate TBPC was present at maximum concentrations of <5 to 63 ug/L. Propargite concentrations in the pond sediments ranged from <25 to 930 ug/L; while TBPC concentrations ranged from <25 to 72 ug/L. In all the studies, any propargite or TBPC reaching the pond was below the detection limit within 2 or 3 weeks after the final application. Runoff water collected at various locations in the fields after runoff events showed maximum propargite concentrations ranging from 18 to 269 ug/L, while TBPC concentrations ranged from 24 to 77 ug/L. However, no residues in runoff water above the detection limit were found in samples collected 1 month or more after the final application. Because of the variation in data, no half-lives could be calculated.

These studies provide supplemental data related to runoff and spray drift of propargite into farm ponds. (Harned, 1989a-e, MRID 40969501, 41057402, 41057401, 41153201, 41153205, 41225601, 41184001, Harned, 1990, MRID 41663201)

Bioconcentration
In a study conducted with bluegill sunfish (*Lepomis macrochirus*) at a concentration of 3.1 ug/L propargite for 35 days, bioconcentration factors were 260X for fillet, 1550X for viscera, and 775X for whole fish tissues. A steady state of bioaccumulation was reached after approximately 10 days of exposure. Depuration was relatively rapid, with 82% of the accumulated radioactive

residues eliminated after 14 days in non-treated water. Based on these data, propargite does not appear to bioaccumulate significantly in fish. The fish bioconcentration study is fulfilled. (Surprenant,1988, MRID 40494801; McManus,1993, MRID 40916601)

Water Resource Assessment

Because propargite is not included among regulated or unregulated chemicals required as analytes in testing of public drinking water supplies, direct drinking-water monitoring results are not available. Therefore, the aquatic and drinking water exposure assessments are based on both modeling predictions and ambient water monitoring data.

The Health Effects Division (HED) has concluded that parent propargite is the only residue included in the tolerance expression for propargite. Therefore, EFED conducted modeling predictions only on the parent.

Model simulations (described below) show that propargite may reach surface drinking water supplies, but should not reach ground water in significant amounts, because it is immobile in soil (K_{oc} = 2953 to 57966 mL/g). Propargite has in fact been detected in surface water in the USGS NAWQA program at a maximum (estimated) concentration of 20 ug/L. Propargite was detected in 175 of 5196 NAWQA surface water samples from 1991 to 1995.

Because the Tier I (GENEEC) surface water modeling predicted that the 56-day average propargite concentrations in surface water (see appendices) were likely to exceed the chronic drinking water level of comparison (DWLOC), Tier II (PRZM-EXAMS using the index reservoir and percent crop area factors) modeling was conducted as a refinement to the drinking water exposure assessment. Tier II modeling simulated propargite residues of 8.7 µg/L (Table 6) for the chronic value. Since this value also exceeded the chronic DWLOC, EFED investigated the NAWQA monitoring data further to evaluate how it compared to the modeling results The maximum time-weighted annual mean concentration of propargite in surface water from the site with the highest concentrations detected was 1.24 ug/L. This value, which is still considerably higher than the chronic DWLOC, can not be considered the highest value that could be found with more extensive monitoring. However, it is within an order of magnitude of the value simulated by PRZM-EXAMS.

The USGS monitoring data from the NAWQA program were also consistent with the acute concentrations simulated by PRZM-EXAMS (Table 5). The maximum (estimated) propargite concentration detected in surface water was 20 µg/L. Although this concentration was detected in an area of extensive propargite use, higher monitoring values are possible. The acute concentrations simulated by PRZM-EXAMS ranged from 11 to 31 µg/L for the five crop scenarios chosen.

SCI-GROW modeling (See Appendix 1 for input parameters)) indicates that total propargite concentrations in ground water are not likely to exceed 0.006 µg/L for both peak (acute) and annual average (chronic) concentration. Similarly, targeted USGS groundwater monitoring data found a maximum propargite concentration of 0.009 µg/L, although higher concentrations are possible. Propargite was only detected in 2 of 3023 ground water samples reported from1991 to 1995.

Because propargite's toxicity levels of concern to some aquatic life were exceeded using Tier I modeling, EECs were also calculated from Tier II modeling (without using the index reservoir and percent crop area factors). The aquatic exposure assessment for propargite was conducted at application rates of 1.6 to 4.5 lb ai/A for the citrus, corn, cotton, potato, and walnut use patterns in order to give a wide range of possible runoff scenarios.

Surface Water Modeling

Tier I Modeling
Input and output parameters for GENEEC (see Appendix 1) were selected according to current EFED guidance. GENEEC modeling indicates that maximum propargite concentrations are not likely to exceed 69.01µg/L for peak and 22.81 µg/L 56 day average concentrations (Table 4). Targeted USGS monitoring data found maximum propargite concentrations in surface water of 20 µg/L, although higher concentrations are possible.

EFED's Tier II Modeling
Since the 56-day average concentrations for propargite residues from GENEEC modeling exceeded the chronic concern concentration for the general population and children deemed critical by HED, PRZM-EXAMS modeling was conducted using the index reservoir and percent crop area factors to refine the drinking water exposure assessment. Similarly, because propargite exceeded some levels of concern for aquatic organisms in Tier I (GENEEC) modeling, EECs were simulated from Tier II modeling (without the index reservoir and percent crop area factors). Because propargite is used on various crops throughout the U.S., five different scenarios were simulated to estimate what the runoff concentrations would be under a range of crops. Several factors were considered in choosing modeling scenarios to provide a wide range of runoff possibilities. These factors included maximum application rate, number of applications, interval between applications, irrigation systems, and the soil vulnerability. Surface water concentrations were simulated for propargite application to citrus in Florida, corn in Kansas, cotton in Mississippi, potatoes in Idaho and two for walnuts in Arizona/California (irrigated and non-irrigated). A summary table of PRZM/EXAMS inputs can be found in Appendix 1. Table 4 presents the peak and mean propargite concentrations from the simulations without crop area factors considered. Table 5 presents results of a single run with index reservoir and percent crop area factors included

Table 4. Surface water concentrations of propargite predicted from Agency PRZM-EXAMS standard scenarios modeled for citrus in Florida, corn in Kansas, cotton in Mississippi, potatoes in Idaho, and walnuts in California.

Crop	Scenario	1 in 10 Yr. Peak Concentration [µg/L]	36 year annual mean Concentration [µg/L]	36-Year Mean Concentration [µg/L]
citrus	irrigation 21 day interval	13.11	2.02	2.28
corn	no irrigation 7 day interval	22.20	1.97	3.04
cotton	irrigation 7 day interval	31.4	4.39	7.72
potatoes	no irrigation 7 day interval	11.34	1.36	2.08
walnuts	no irrigation 7 day interval	19.09	1.33	1.49
walnuts	flood 7 day interval	25.79	3.88	4.04

Table 5. Surface water concentrations of propargite predicted from PRZM-EXAMS standard scenario modeled for cotton in Mississippi using index reservoir and percent crop area factors.

Crop	Scenario	1 in 10 yr. Peak Concentration [µg/L]	Average 36 year annual mean Concentration [µg/L]	36-year Mean Concentration [µg/L]
Cotton	irrigation, 7 day interval	34.3	5.6	8.7

Registrant's Tier II Modeling

The registrant (Uniroyal Chemical) conducted PRZM2-EXAMS modeling for propargite using scenarios of corn grown in the High Plains region of Texas and citrus grown in three counties in Florida. The modeling was conducted using an application rate of 2.5 lb ai/A (one application on corn and two applications on citrus at a 25-day interval). Based on the registrant's PRZM2-EXAMS modeling, the maximum annual mean cumulative propargite residue concentration was 0.3 to 0.5 and µg/L and for citrus and corn, respectively. The maximum label application rate for propargite is 4.5 lb ai/A applied two times on walnuts.

The EFED can not accept the the results from this modeling because the registrant used an older version of PRZM and the application rate was lower than the maximum allowed on the label for citrus (4.5 lb ai/A).

Surface Water Monitoring

Propargite has been detected in targeted surface-water monitoring studies. In the USGS NAWQA monitoring program (http://water.wr.usgs.gov/pnsp/allsum/), propargite was detected in 175 of 5196 samples for the period 1991 to 1995, with a maximum concentration of 20.0 ug/L. Out of the total 5196 samples, propargite was detected in 53 of 1000 samples taken from agricultural streams, with one sample having a maximum concentration of 20.0 ug/L. The next highest concentration was 3.7 ug/L. The USGS reported that although the single high value is believed to be reliable, there was uncertainty in this value because it was beyond the calibration range of the instrument used. Propargite was detected in 1 of 327 samples taken from urban streams, at a concentration of 0.015 ug/L. Propargite was detected in 8 of 245 samples taken from 14 integrator sites on large streams and rivers, with a maximum concentration of 2.0 ug/L. The analytical recovery of propargite was reported as 64% (±16%) with a detection limit of 0.004 µg/L in reagent water.

Propargite detections in the NAWQA study were predominantly associated with the San Joaquin-Tulare study unit at intensive-fixed monitoring sites (reference: http://water.usgs.gov/pubs/circ/circ1159/ sec1.html). This region corresponds with high propargite use (> 1.526 lb propargite/mile^2/year, reference http://water.wr.usgs.gov/pnsp/use92/proprgit.html). Propargite use in the San Joaquin region is probably associated with beans, cotton, and almond production. The STORET surface-water database also reports these detections of propargite.

Quantitative Assessment of NAWQA Monitoring Data Using Time-Weighted Averaging

The NAWQA monitoring data for the Orestimba Creek Watershed were evaluated for the maximum annual peak, time weighted annual mean for non-detection modified data and the arithmetic annual mean for 1992 and 1993. This assessment was performed for comparison to the chronic DWLOC since the Tier II estimation of the DWLOC was exceeded. For purposes of the assessment of non-detection-modified monitoring, non-detectable data were modified to be equal to one-half the detection limit.

The equation used for calculating the time weighted annual mean is as follows:

$$\frac{[((T_{0+1}-T_o) + ((T_{0+2}-T_{0+1})/2))*C_{T0+1})] + \sum(((T_{I+1}-T_{I-1})/2)*C_i) +[((T_{end}-T_{end-1})+((T_{end-1}-T_{end-2})/2)*C_{Tend-1})]}{365}$$

where: C_i=Concentration of pesticide at sampling time (T_i)

T= Julian time of sample with concentration C_i

T_0=Julian time at start of year=0

T_{end}=Julian time at end of year=365.

The maximum time-weighted mean (TWM) and arithmetic mean for the detection modified data were, respectively, 0.3 and 0.5 for 1992 and 1.24 and 0.55 ug/L for 1993. For both years combined, the TWM and arithmetic mean for the detection modified data were, respectively, 0.77 and 0.52 ug/L. Although these data include the highest propargite concentrations detected in the NAWQA program to date, they cannot with any confidence be considered the highest concentrations that might be found with more extensive monitoring. The data represent only two years of monitoring in an area of extensive propargite use. It is not clear whether propargite use and annual rainfall were greater in 1992 and 1993 than they have been or will be in other years.

Table 6. Propargite concentration in surface water samples based on time-weighted averages for Oristimba Creek Watershed.

Year	Number of samples	Sample Timing	Annual Peak-ug.L	Means-ug/L	TWA Means-ug/L
1992	45	4/15-12/15/92	3.7	0.50	0.30
1993	40	1/8-11/17/93	20.0	0.55	1.24
Both years	85	4/15/92-11/17/93	Not Applicable	0.52	0.77

Ground Water Modeling

Ground water concentrations were predicted with SCI-GROW. Input parameters were chosen according to EFED current guidelines and are summarized in appendices. Half lives were based on reported laboratory studies. The predicted groundwater concentration is 0.006 ug/L.

There is considerable inherent uncertainty in making estimates of groundwater concentrations with empirical models such as SCI-GROW. In this context, SCI-GROW predicts the concentrations of the twelve chemicals used for its own calibration to only within about an order of magnitude. In addition, the SCI-GROW model is based on a single application of pesticide without the expectation that the pesticide may accumulate over the course of several years of pesticide use. Thus, ground water concentrations of propargite may be vastly different than the SCI-GROW prediction. Regardless of the SCI-GROW prediction, fate studies suggest that propargite has a low potential to reach groundwater.

Ground Water Monitoring

Based on its chemical and environmental fate properties, propargite is not expected to be a commonly detected groundwater contaminant. Propargite has been detected in non-targeted, ground-water monitoring studies at low concentrations. In the USGS NAWQA groundwater monitoring program (http://water.wr.usgs.gov/pnsp/allsum/), propargite was detected in 2 of 3023 samples reported for the period 1991 to 1995, with a maximum detected concentration of 0.009 ug/L. Propargite was detected at a maximum concentration of 0.009 *u*g/L in 1 of 924 samples taken from shallow ground water in agricultural areas. Propargite was not detected in 301 samples taken from shallow ground water in urban areas, or in 933 samples taken from major aquifers. In addition, the EPA ground water data base (1992), which did include records for propargite, reported no detections in 382 wells monitored in California between 1984-87.

Drinking Water Estimates

EFED recommends that the Health Effects Division use the concentrations presented in Table 7 for drinking water EECs. Maximum drinking water EECs were based on the runoff scenario for irrigated cotton in Mississippi (using the index reservoir and percent crop area factors). The concentration in surface water is not expected to exceed a peak of 34.3 ug/L and with 1:10 annual mean of 8.7 ug/L. Monitoring data described above include a maximum concentration of 20 ug/l and a maximum time-weighted annual concentration of 1.24 ug/l. EFED cannot assume with confidence that these values are the highest that could be detected with more extensive surface-water monitoring. However, these values are within the same order-of-magnitude as the modeling results recommended for the dietary exposure assessment. For groundwater, the concentration of propargite is not expected to exceed 0.009 ug/L, based on monitoring from the NAWQA program.

Table 7. Drinking water estimated environmental concentrations for propargite using the index reservoir and percent crop area factors.

Source of Water	Peak	36 year Annual Mean[a]	1:10 Annual Mean
Ground Water	0.006 ug/L	N/A	N/A
Surface Water	34.3 ug/L	4.8 ug/L	8.7 ug/L

[a] mean taken over entire 36-year simulation period.

AQUATIC RISK ASSESSMENT

In terms of acute toxicity, propargite is highly (LC50<1000 ug/L) to very highly toxic (LC50<100 ug/L) to freshwater aquatic organisms with all LC50 or EC50 values for technical ingredient below 167 ug/L. Propargite is very highly toxic to estuarine/marine organisms-all LC50 values ≤100 ug/L. Though propargite is registered for over forty different uses, the five modeled PRZM/EXAMS scenarios were determined to represent a good picture of potential exposure based on a wide range in application rates, use of 2 and 3 multiple applications, and 5 different geographical locations. Based on these predicted EEC levels divided by the most sensitive species toxicity value the following risk determinations are predicted:

Acute risk levels of concern (RQ≥ 0.5) are exceeded or approached for estuarine fish and freshwater invertebrates exposed to propargite at 2 of the 5 modeled application sites (walnuts and cotton at 4.5 and 1.6 lb ai/A)).
Acute restricted use levels (RQ≥ 0.2) are exceeded for freshwater and/or estuarine fish and invertebrates at most sites with multiple applications at 1.6 to 4.5 lb ai/A.
Acute endangered species concern levels (RQ≥ 0.05) for freshwater/estuarine fish and invertebrates will be exceeded at most application sites when multiple applications are made at 1.6 to 4.5 lb ai/A.
Chronic concern levels for freshwater invertebrates (RQ≥ 1.0) are exceeded for over 60 days at a rate range from 1.6 to 4.5 lb ai/A applied 2-3 times (walnut, corn, and cotton scenarios).
Chronic risk concerns for freshwater fish (RQ≥ 1.0) will be approached or exceeded for over 60 days for three applications made at a rate of ≥1.6 lb ai/A (cotton scenario).

Table 8. Tier II Aquatic Risk Estimates for Five Propargite Aerial Application Scenarios

Site APPL. Rate (lb ai/A) and (# APPL.) and interval	Tier II Peak*, 21 day ,& 60 day EEC ug/L	Freshwater Fish (rainbow trout) LC50= 118 ug/L Fish chronic NOEC=16 ug/L	Freshwater Inverts (Daphnia) EC50=74 ug/L NOAEC=9 ug/L	Estuarine Fish (sheepshead minnow) LC50=60 ug/L no chronic data**	Estuarine Invertebrates (quahog clam) LC50=80 ug/L no chronic data
CA walnuts 4.5 lb ai/A x 2 (7 D interval)	25.79 17.4 12.1	Acute RQ=0.221 Chronic RQ=0.76	Acute RQ=0.35 Chronic RQ=1.9	Acute RQ=0.43	Acute RQ=0.32
Kansas corn 1.6 lb ai/A x 2 (7 D interval)	22.20 12.02 7.68	Acute RQ=0.19 Chronic RQ=0.48	Acute RQ=0.3 Chronic RQ=1.33	Acute RQ=0.37	Acute RQ=0.28
MS. cotton 1.6 lb ai/A x 3 (7 D interval)	31.43 19.24 15.91	Acute RQ=0.27 Chronic RQ=1.0	Acute RQ=0.42 Chronic RQ=2.14	Acute RQ=0.52	Acute RQ=0.39
Florida Citrus 3.0 lb ai/A x 2 (21D interval)	13.11 7.52 4.54	Acute RQ=0.11 Chronic RQ=0.28	Acute RQ=0.18 Chronic RQ=0.84	Acute RQ=0.22	Acute RQ=0.16
Idaho Potato 2.0 lb ai/A x 2 (7 D interval)	11.34 7.07 4.72	Acute RQ=0.10 Chronic RQ=0.30	Acute RQ=0.15 Chronic RQ=0.79	Acute RQ=0.19	Acute RQ=0.14

$\geq$0.5 Exceeds acute risk; $\geq$0.1 Exceeds restricted use risk; $\geq$0.05 Exceeds endangered species risk $\geq$1.0 Exceeds chronic risk LOC
* Peak represents 1 in 10 year event under the modeled PRZM/EXAM conditions
**Chronic toxicity to estuarine organisms was not assessed due to lack of chronic data for these organisms.

Risk to Amphibians
Based on the high toxicity of propargite to fish, propargite is also expected to demonstrate high toxicity to amphibians, particular to early life stages that are primarily aquatic and where respiration is dependent on gills(such as tadpoles)or where later adult stages retain external gill structures (primitive salamanders). Amphibians often inhabit shallow littoral areas where incoming runoff concentrations may be the highest.

Sediment Toxicity
As propargite is expected to bind to sediments, increased exposure to sediment dwelling organisms may occur. A supplemental study (MRID 43371502) with *Daphnia magna* and rainbow trout (neither are sediment organisms) was submitted in which the organisms were exposed to three exposure paths: organisms added to vessels with propargite tainted sediment already suspended in the water column, organisms added to vessels with propargite already contained primarily in bottom sediment, and organisms exposed to propargite tainted sediment added to the test vessels after acclimation to uncontaminated dilution water. High toxicity was observed for both organisms exposed to contaminated sediment suspended in the water column or when exposed to pre-contaminated bottom sediment. The toxicity for both daphnia and trout

was reduced when already contaminated sediment was introduced after organisms were already acclimated in the test vessels. Though interesting, the study did not provide controls or adequate replicates to allow confirmation of the statistical significance of observed mortality levels, however it suggests that residues bound to sediments may not be bioavailable on initial introduction to aquatic habitats.

TERRESTRIAL RISK ASSESSMENT

Terrestrial Exposure

Initial propargite residue levels on various types of vegetation from single applications are based on research of Hoerger and Kenaga (1972) and later modified by Fletcher *et al.* (1994) (Table 9). Estimated terrestrial exposure levels of multiple application residues available for dietary ingestion were generated by calculating first-order decay of a chemical applied to foliar surfaces from single or multiple applications. Input parameters for the model are presented in Table 10 **.** A 30-day foliar dissipation default rate is assumed for propargite as per EFED Policy memo of August 26, 1999, which is based on literature review of foliar dissipation rates of 32 pesticides on multiple crops (Willis and McDowell, 1987). This rate is assumed in the absence of valid foliar dissipation data studies on propargite. Uncertainties in the terrestrial EECs are primarily associated with a lack of data on interception and subsequent dissipation from foliar surfaces. EFED assumes the foliar dissipation rate is based on a number of routes which include photolysis, hydrolysis and volatilization. Washoff from precipitation and application location on foliar surfaces might also affect transport.

Table 9. Estimated environmental concentrations on avian and mammalian food items (ppm) following a single application at 1.6 to 4.5 lb. ai/A

Food Items	Cotton/Corn Maximum Residue (ppm)	Potatoes Maximum Residue (ppm)	Citrus Maximum Residue (ppm)	Walnuts Maximum Residue (ppm)
Application Rate	1.6 lb ai/A	2.0 lb ai/A	3.0 lb ai/A	4.5 lb ai/A
Short grass	384	480	720	1080
Tall grass	176	220	330	495
Broadleaf plants and small insects	216	270	405	608
Fruits, pods, seeds, and large insects	24	30	45	68

Table 10. Model Input Parameters for Multi-Application EECs Presented in Tables 11 - 15

Input	Cotton	Corn	Potato	Citrus	Walnut
Rate	1.6 lb a.i	1.6 lb a.i./acre	2.0 lb	3.0 lb	4.5 lb
Applications	3	2	2	2	2
Interval (assumed)	7 days	7 days	7 days	7 days	7 days
Foliar t1/2	30 days	30 days	30 days	30 days	30 days

Terrestrial Risk

Terrestrial risk estimates for all of the over forty possible use scenarios for propargite were not estimated. However, the five crop selections are believed to offer a good representation of possible use scenarios to which wildlife might be exposed. Variations in application intervals could affect these risk quotient calculations, though the environmental fate profile of propargite suggests that the effect would probably not be significant. Calculations for mammalian risk quotients are based on a rat LD50 of 2639 mg /Kg (MRID 42857001) and chronic effects observed at 400 ppm (MRID 417509901). Though some effects were observed in male rats at 80 ppm, both females and offspring were affected at 400 ppm. Therefore this value was used in RQ calculations.

Predicted levels of risk for mammals were as follows:

- **Chronic risk concerns (RQ≥ 1.0) for herbivorous/insectivorous mammals** were exceeded for all five modeled single and multi application crop use scenarios and is predicted for any application scenario over 1.5 lb ai/A with the exception of strictly seed eating mammals.
- **Acute risk concerns (RQ≥0.5) for small herbivorous/insectivorous mammals** were approached or exceeded by predicted exposures to multiple applications of propargite at rates of 3.0 to 4.5 lb ai/A (based on walnut and citrus (RQ=0.48) scenarios).
- **Acute restricted use concerns for small mammals (RQ≥ 0.2)** were exceeded by single applications at 4.5 an 3.0 lb ai/A and by multiple applications to all 5 modeled scenarios (1.6 to 4.5 lb ai/A).
- **Acute endangered species concerns (RQ≥ 0.1) for small herbivorous/insectivorous mammals (up to 35 grams)** were exceeded in all 5 single and multi application scenarios (use rates from 1.6 to 4.5 lb ai/A) and exceeded for herbivorous 1000 gram mammals in multi application walnut, citrus, cotton and potato scenarios (use rates from 1.6 to 4.5 lb ai/A).

In general, acute risk (RQ≥ 0.5) for larger species of mammals is not indicated by calculated risk quotients. Some potential for acute effects is predicted for small (≤ 35 gm body wt) high metabolism herbivorous mammals at multiple applications at high rates (4.5 lb ai/A). Restricted use and endangered species concern levels for herbivorous and/or insectivorous mammals are exceeded by a number of label permitted application scenarios where application rates exceed 1.5 lb ai/A.

Table 11. Herbivorous/Insectivorous Mammals Single Application Acute /Chronic RQs

	Single Application residues in ppm	Mammals @ 15g LC50 = 2778 ppm estimated based on 95% body wt ingestion	Mammals @ 35g LC50=3998 ppm estimated based on 66% body wt ingestion	Mammals @ 1000g LC50 = 7997 ppm estimated based on 33% body wt ingestion	Rat NOEL = 400 ppm
crop	**EEC food item**	**Acute RQ**	**Acute RQ**	**Acute RQ**	**Chronic**
Walnuts 4.5 lb ai/A	short grass-1080 tall grass-495 broadleaf-608 fruit-68	short grass-0.389 tall grass-0.178 broadleaf-0.219 fruit-0.024	short grass-0.270 tall grass-0.124 broadleaf-0.152 fruit-0.017	short grass-0.135 tall grass-0.06 broadleaf-0.07 fruit-0.008	2.7 to 0.17
Citrus 3.0 lb ai/A	short grass-720 tall grass-330 broadleaf-405 fruit-45	short grass-0.26 tall grass-0.12 broadleaf-0.15 fruit-0.0.016	short grass-0.18 tall grass-0.08 broadleaf-0.1 fruit-0.01	short grass-0.09 tall grass-0.04 broadleaf-0.05 fruit-0.005	1.8 to 0.1
Potato 2.0 lb ai/A	short grass-480 tall grass-220 broadleaf-270 fruit-30	short grass-0.173 tall grass-0.079 broadleaf-0.097 fruit-0.011	short grass-0.120 tall grass-0.055 broadleaf-0.068 fruit-0.008	short grass-0.06 tall grass-0.002 broadleaf-0.034 fruit-0.003	1.2 to 0.07
Corn 1.6 lb ai/A Cotton 1.6 lb ai/A	short grass-384 tall grass-176 broadleaf-216 fruit-24	short grass-0.138 tall grass-0.063 broadleaf-0.078 fruit-0.086	short grass-0.096 tall grass-0.044 broadleaf-0.054 fruit-0.006	short grass-0.05 tall grass-0.02 broadleaf-0.03 fruit-0.003	0.96 to 0.06

Table 12. Granivorous Mammals- Single Application RQs Acute and Chronic

Site APPL. Rate	**Single Appl. residues**	**Mammal 15g LC50=12566 ppm of seeds (estimate based on 21% ingestion)**	**Mammal 35g LC50 = 17593 ppm of seeds (estimate based on 15% ingestion)**	**Mammal 1000g LC50= 87966 ppm of seeds (estimate based on 3% ingestion)**	**Based on 400 ppm NOEL**
	in ppm	**Acute RQ**	**Acute RQ**	**Acute RQ**	**Chronic RQ**
4.5 lb ai/A walnuts	seeds-68	seeds-0.024	seeds-0.017	seeds-0.039	0.17
3.0 lb ai/A citrus	seeds-16	seeds-0.006	seeds-0.004	seeds-0.01	0.04
2.0 lb ai/A potato	seeds-30	seeds-0.011	seeds-0.008	seeds-0.02	0.08
1.6 lb ai/A cotton/corn	seeds-24	seeds-0.086	seeds-0.006	seeds-0.01	0.06

Acute risk is $\geq$0.50
Restricted use risk is $\geq$0.2
Endangered species risk is $\geq$0.1

Acute RQ = EEC / LD50 / function body-weigh consumed daily
Chronic risk = $\geq$1.0 on chronic table

Table 13. Herbivorous/Insectivorous Mammals Multi Application - Acute /Chronic RQs

Site /APPL. Rate (lb ai/A) and # APPL. and interval	Residues in ppm	Mammals @ 15g LC50 = 2778 ppm estimate based on 95% body wt. ingestion	Mammals @ 35g LC50=3998 ppm estimate based on 66% body wt ingestion	Mammals @ 1000g LC50 = 7997 ppm estimate based on 33% body wt ingestion	NOEL = 400 ppm
		Acute RQ	**Acute RQ**	**Acute RQ**	**Chronic**
walnuts 4.5 lb ai/A x 2 assuming 7 day interval	short grass-1998.7 tall grass-916.1 broadleaf-1124.3 fruit-124.9	short grass-0.719 tall grass-0.330 broadleaf-0.405 fruit-0.045	short grass-0.500 tall grass-0.229 broadleaf-0.281 fruit-0.031	short grass-0.25 tall grass-0.11 broadleaf-0.14 fruit-0.02	5.0 to 0.3
Florida Citrus 3.0 lb ai/A x 2 assuming 7 day Interval	short grass-1332 tall grass-610 broadleaf-749 fruit-83	short grass-0.48 tall grass-0.20 broadleaf-0.27 fruit-0.03	short grass-0.33 tall grass-0.15 broadleaf-0.19 fruit-0.02	short grass-0.16 tall grass-0.08 broadleaf-0.09 fruit- 0.01	3.3 to 0.2
Idaho Potato 2.0 lb ai/A x 2 assuming 7 day interval	short grass-888 tall grass-407 broadleaf-500 fruit-56	short grass-0.320 tall grass-0.147 broadleaf-0.180 fruit-0.020	short grass-0.222 tall grass-0.102 broadleaf-0.;013 fruit-0.014	short grass-0.11 tall grass-0.05 broadleaf-0.06 fruit-0.003	2.2 to 0.14
MS. cotton 1.6 lb ai/A x 3 assuming 7 day interval	short grass-989 tall grass-453 broadleaf-556 fruit-62	short grass-0.356 tall grass-0.163 broadleaf-0.200 fruit-0.022	short grass-0.247 tall grass-0.113 broadleaf-0.139 fruit-0.016	short grass-0.12 tall grass-0.06 broadleaf-0.07 fruit-0.007	2.5 to 0.16
corn 1.6 lb ai/A x 2 assuming 7 day interval	short grass-711 tall grass-326 broadleaf-400 fruit-44	Short grass-0.256 tall grass-0.117 broadleaf-0.144 fruit-0.016	short grass-0.178 tall grass-0.081 broadleaf-0.100 fruit-0.011	short grass-0.08 tall grass-0.04 broadleaf-0.05 fruit-0.005	1.8 to 0.11

Acute RQ = EEC / LD50 / function body-weight consumed daily

Table 14. Granivorous Mammals- Multiple Applications - Acute and Chronic RQs

Scenario same as above table	Multiple Application	Mammal 15g LC50=12566 ppm of seeds (estimate based on 21% ingestion)	Mammal 35g LC50 = 17593 ppm of seeds (estimate based on 15% ingestion)	Mammal 1000g LC50= 87966 ppm of seeds (estimate based on 3% ingestion)	Based on 400 ppm NOEL
Residues in ppm		**Acute**	**Acute**	**Acute**	**Chronic**
Walnuts	seeds-125	seeds-0.045	seeds-0.031	seeds-0.07	0.31
Citrus	seeds-83	seeds-0.07	seeds-0.005	seeds-0.0009	0.07
Potato	seeds-56	seeds-0.020	seeds-0.014	seeds-0.03	0.14
Cotton	seeds-62	seeds-0.022	seeds-0.016	seeds-0.04	0.15
Corn	seeds-44	seeds-0.016	seeds-0.011	seeds-0.03	0.11

Acute risk is $\geq$0.50
Restricted use risk is $\geq$0.2 Acute RQ = EEC / LD50 / function body-weigh consumed daily
Endangered species risk is $\geq$0.1 Chronic risk = $\geq$1.0 on chronic table

Avian Risk
Predicted exposure levels on food sources were divided by the most sensitive dietary LC50 of 3401 ppm or the chronic NOEL of 43.2 for growth. Results are presented in Table 17. Based on these computations predicted levels of risk for birds were as follows:

- **Chronic risk concerns for birds (RQ≥ 1.0)** were exceeded for all five crops for both single and multiple application scenarios. Chronic risk is predicted for all propargite crop application scenarios with rates over 0.5 lb ai/A, with the exception of strictly seed eating birds.
- **Acute risk concerns for birds (RQ≥0.5)** exceeded by the high rate scenario only (2 x 4.5 lb ai/A)
- **Acute restricted use concern levels for birds (RQ≥ 0.2)** were exceeded by single application scenarios at 3.0-4.5 lb ai/A and to all 5 multi-applications scenarios (1.6 to 4.5 lb ai/A).
- **Acute endangered species concern levels for birds (RQ≥ 0.1)** were exceeded for single and multi application scenarios for all modeled scenarios (1.6 to 4.5 lb ai/A)

Chronic effects to birds included reductions in mean numbers of eggs laid/female(mallard and bobwhite), viable embryos (mallard), live 3 wk embryos (mallard), hatch success (mallard), hatchling survival and weight (mallard and bobwhite), adult body weight change (mallard) at 288 ppm. In mallard slight reductions were also observed at 84.7 ppm adult body wt change (bobwhite and mallard), eggs laid/female, live embryos, and hatchling survival. Corresponding application scenarios that might equate to these levels could include single or multiple applications at rates below 1.5 lb ai/acre.

Table 15. Acute and chronic risk quotients for birds following exposure to propargite applied at the proposed single maximum application rates from 1.6 to 4.5 lb ai/A.

Avian - Single and Multiple Application RQs for Acute and Chronic Risk
LC50 = 3401 ppm (bobwhite quail) Avian NOAEL=43.2 ppm

Single Application residues and RQs				**Multiple Application EECs and RQs**		
Multi-Application Scenario	**Maximum EEC in PPM**	**Acute RQ**	**Chronic RQ**	**Maximum EEC in PPM**	**Acute RQ**	**Chronic RQ**
Walnuts 4.5 lb ai/A x 2 7 day interval	short grass-1080 tall grass-495 broadleaf-608 fruit/seeds-68	0.317 0.150 0.180 0.02	25 11.5 14.1 1.6	short grass-1998.7 tall grass-916.1 broadleaf-1124.3 fruit/seeds-124.9	0.59 0.27 0.33 0.04	4621263
Citrus 3.0 lb ai/A x 2 7 day interval	short grass-720 tall grass-330 broadleaf-405 fruit/seeds-45	0.21 0.09 0.11 0.012	16.7 7.7 9.4 1	short grass-1332 tall grass-611 broadleaf-749 fruit/seeds-83	0.4 0.2 0.22 0.02	31 14 17.4 2.0

Avian - Single and Multiple Application RQs for Acute and Chronic Risk
LC50 = 3401 ppm (bobwhite quail) Avian NOAEL=43.2 ppm

Single Application residues and RQs				Multiple Application EECs and RQs		
Potato 2.0 lb ai/A x 2 7 day interval	short grass-480 tall grass-220 broadleaf-270 fruit/seeds-30	0.14 0.064 0.080 0.0071	11 5.1 6.2 0.7	short grass-888 tall grass-407 broadleaf-500 fruit/seeds-56	0.26 0.12 0.15 0.016	21 9.4 11.6 1.3
Corn 1.6 lb ai/A x 2 7 day interval	short grass-384 tall grass-176 broadleaf-216 fruit/seeds-24	0.113 0.052 0.064 0.0071	8.9 4.1 5.0 0.5	short grass-711 tall grass-326 broadleaf-400 fruit/seeds-44	0.21 0.10 0.12 0.013	16.5 7.6 9.3 1.0
Cotton 1.6 lb ai/A x 3 7 day interval	short grass-384 tall grass-176 broadleaf-216 fruit/seeds-24	0.113 0.052 0.064 0.0071	8.9 4.1 5.0 0.5	short grass-989 tall grass-453 broadleaf-556 fruit/seeds-62	0.29 0.13 0.16 0.02	23 10.5 12.9 1.4

Acute Dietary RQ =EEC / LC50 Acute risk is $\geq$0.50 Restricted use risk is $\geq$0.2 Endangered sp. risk is $\geq$0.1
Chronic RQ=EEC/NOEC Chronic risk is $\geq$1.0 on chronic table

Nontarget Insect Risk
The acute contact LD50 was determined to be 15 ug ai/bee which is classified as nearly non-toxic to honeybees. Non-target honeybee populations are not expected to be significantly affected from exposure to propargite insecticide. However, valued species such as predaceous mites, other bee species, and leafcutter bees have been slightly affected at dosages less than the proposed application rates. A non-guideline study reported that 12% honeybee mortality was observed 24 hours after an application of Omite 6EC at 1.5 lb ai/A.

Terrestrial and Semi-Aquatic Plant Risk for Propargite Uses
Based on test results from testing of 10 crop species at application rates of up to 2.45 lb ai/A and lack of significant observed effects to nontarget terrestrial plants, most uses of propargite are not expected to offer risk concerns for terrestrial plants. Maximum expected off target drift from applications at the highest rate of 4.5 lb ai/A to walnuts would not be expected to reach residue levels equivalent to direct applications of 2.45 lb ai/A. For this reason a full risk quotient table for terrestrial plants was not developed. However, concerns for phytotoxicity (mainly necrosis) to certain plant species are clearly stated on propargite product labels, even though not observed in the submitted guideline studies. Therefore, there is potential for similar effects if non-target plants receive levels of residual drift equivalent to levels which cause phytotoxicity in target crop and ornamental plant species.

Aquatic Plant Risk Quotients For Walnut, Corn, Citrus, Potato and Cotton Usage.
Based on the predicted environmental concentrations for surface water, LOCs-(Levels of Concern) for most genera of aquatic plants are not likely to be exceeded. However certain groups may be highly sensitive as were the saltwater diatom *Skeletonema costatum* (EC50 = 19 ug/L) and the freshwater algae *Navicula pelliculosa* (EC50 = 106 ug/L). Sensitivity among

various types of aquatic plants varied by an order of magnitude with EC50 levels in both mg/L and ug/L. For individual toxicity values for multiple species refer to the appendices of this document.

Table 16. Aquatic Plant Risk Estimates

Site **APPL. Rate(lb ai/A) and (No APPL.) and interval**	**Peak EEC** **(1 in 10 year event)**	**Most sensitive species** **EC50=19.4 ug/L *Skeletonema costatum***
PRZM3/EXAM II	**All EEC estimates in ug/L-assuming 7D interval except citrus**	
walnuts-4.5 lb ai/A X 2 app.	25.79	Acute RQ = 1.3*
corn at 1.6 lb ai/A X 2 app.	22.2	Acute RQ = 1.1*
Mississippi cotton at 1.6 lb ai/A X 3 app	31.43	Acute RQ = 1.6*
Florida Citrus at 3.0 lb ai/A X 2 app.	13.11	Acute RQ= 0.7
Idaho Potato at 2.0 lb ai/A X 2 app	11.34	Acute RQ = 0.6

* Exceeds acute risk level of concern (RQ=1.0)

Ecological Incidents

The Agency incident database contains a single incident with propargite. The incident involved crop injury to 82 acres of newly planted cotton crops in Arvin, CA. Propargite, chlorpyrifos, and amitraz were all applied. Propargite (Comite) labels warn against possible phytotoxicity to young cotton plants.

No mortality incidents with wildlife, non-target insects, or aquatic organisms have been reported for propargite. However, the types of chronic concerns for birds and mammals expressed for propargite are unlikely to be observed in normal usage. Also, acute mortality to non target invertebrates (terrestrial or aquatic) is generally not observed or reported in incident reports, even when high mortality is reported for birds, mammals, amphibians or fish..

Endangered Species

At currently proposed rates, endangered species risk presumption levels are exceeded for both freshwater and estuarine/marine fish and invertebrates at the label permitted application scenarios for propargite. Mammalian and avian acute risk for endangered species is exceeded for certain species which may feed heavily on vegetation or insects. Chronic risk concern levels for listed birds and mammals are indicated for many uses. The use of propargite on 1.5 to 2.0 million acres of crop land in over 18 states, including California, is expected to provide potential exposure to listed habitats for aquatic and avian protected species.

The Agency has developed an Endangered Species Protection Program to identify pesticides whose use may initiate adverse impacts on endangered/threatened species. This program also implements mitigation measures that will eliminate the adverse impacts. At the present, this program is being implemented on an interim basis as described in a Federal Register notice(54 FR27984-28008, July 3, 1989), and is providing information to pesticide users to help them protect these species on a voluntary basis. As currently planned, the final program will call for label modifications referring to required limitations on pesticide uses, typically as depicted in county-specific bulletins or by other site specific mechanisms as specified by state patterns. A final program, which may be altered from the interim program, will be described in a future Federal Register notice. Currently, available county specific information, maps and a download version of the Endangered Species data base can be found on the Internet at the Agency website, http://www.epa.gov/ESPP.

INTEGRATED ENVIRONMENTAL RISK CHARACTERIZATION

Terrestrial Risk Characterization

EFED's assessment suggests that the most significant ecological risk posed by the use of propargite is the potential for adverse effects on reproduction in birds and mammals. *The assessment indicates that reproduction risk to birds may occur where propargite is applied a single time at 0.5 lb active ingredient per acre or greater, a rate which is allowed for virtually all labeled uses. Concerns for reproduction risk to mammals are triggered at application rates of 1.6 lb ai/A or greater. These concerns are heightened when multiple applications of propargite, which are allowed by most labels, are factored into the assessment.* Multiple applications of a pesticide can increase organisms' exposure by increasing the concentration of residues on food items and also by extending the period during which these residues may be present. (Although labels do not specify a minimum interval between applications, the EFED assessment assumed a 7-day interval). EFED's conclusions for propargite's potential effects to birds and mammals are based on the following labeled use rates and numbers of applications:2 applications at 4.5 lb ai/A; 2 applications at 3 lb ai/A; 2 applications at 2 lb ai/A; and 2 or 3 applications at 1.6 lb ai/A.

The timing of propargite applications to control target pests coincides with breeding seasons of some birds common to the labeled crop areas. This could expose nesting birds and their developing young to residues which could negatively impact their reproductive success. The chronic effects to birds reported in registrant-submitted studies included reductions in mean numbers of eggs laid/female(mallard and bobwhite), viable embryos (mallard), live 3-week embryos (mallard), hatch success (mallard), hatchling survival and weigh (mallard and bobwhite), and adult body weight change (mallard) at dietary concentration of 288 ppm. At a dietary concentration of 84.7 ppm, slight reductions were also observed in adult body weight change (bobwhite and mallard), eggs laid/female, live embryos, and hatchling survival.

With the exception of multiple applications at 4.5 lb ai/A (RQ = 0.59 for species expected to ingest high amounts of short grass or foliage), avian acute risk assessment scenarios for propargite did not exceed acute risk LOCs for birds. Levels of concern for acute risk are approached, but not exceeded for multiple applications at 3 lb ai/A. Shorter application intervals could increase exposure and risk for these scenarios. A number of application scenarios exceeded restricted use criteria levels (RQ>0.2) at rates of 1.6 lb ai/A and above. For acute toxicity to endangered avian species, all multiple application scenarios assessed exceeded the LOC (RQ>0.1) for short and tall grass and broadleaf plants. RQs for acute effects to birds ingesting primarily fruits and seeds were below levels of concern for acute risk, restricted use, and endangered species.

The assessment suggests the potential for acute effects to mammals for multiple applications at the highest labeled rate of 4.5 lb ai/A (walnut, avocado, and almond). Levels of concern for acute risk are approached but not exceeded for multiple applications at 3 lb ai/A. Mammalian chronic levels of concern (400 ppm exposure levels) may be exceeded at single application rates over 1.6 lb ai/A (which is allowed for many crop uses of propargite) and at multiple application rates above 0.75 lb ai/A which are allowed for all crop uses. However, there were a number of LOCs for the acute restricted use that were exceeded for herbivorous or herbivorous/insectivorous mammals (RQs >0.2) based on terrestrial exposure scenarios. There are acute endangered species risk concerns for herbivorous or herbivorous/insectivorous mammals (RQs>0.1) for many uses. Granivorous mammals are not predicted to be exposed to residues that could result in acute effects. Label language warning against grazing livestock on treated areas suggest the potential for adverse effects to wildlife from ingesting treated food items.

Extreme danger to humans and domestic animals from eye and skin contact with propargite sprays is expressed on propargite labels. Propargite is corrosive and potentially fatal if spray mists are inhaled. Because birds and other terrestrial species utilize orchards as nesting or foraging habitat during the expected application periods, adverse effects to wildlife from dermal contact or inhalation could occur. The severity of effects to birds or other wildlife receiving a propargite exposure from direct contact with droplets or contact with sprayed foliage cannot be determined with confidence because of the lack of relevant data.

Non-target honeybees are not expected to be at risk from exposure to propargite insecticide. However, valued species such as predaceous mites, other bee species, and leafcutter bees have been affected at dosages less than the proposed application rates. A 12% honeybee mortality was observed in a non guideline field study 24 hours after an application of Omite 6EC at 1.5 lb ai/A

The lack of data on propargite persistence on foliage and other avian and mammalian food items is a source of uncertainty in the terrestrial risk assessment. Because no data were available, a default foliar half-life of 30 days was assumed. Foliar dissipation is not expected to be rapid, however, becauase of propargite's photolytic stability, slow hydrolysis at neutral pH values, and low vapor pressure. Rainfall could result in residue washoff thereby reducing terrestrial exposure. Re-application is permitted on most labels, could result in repeated exposure of terrestrial organisms to propargite residues.

Registrant-submitted studies indicated that terrestrial plants tested were mostly unaffected at dosages of up to 2.4 lb ai/A. This is below the maximum rate for propargite, but within expected average use rates for most crops. However, Ornamite and Comite labels warn of possible phytotoxic effects when temperatures exceed 85^{o}F or when petroleum-based spray-oils are used. Under certain environmental conditions, fruit spotting or leaf burn may also occur to target crops. Phytotoxic effects to non-target vegetation bordering treated fields are not likely due to the high quantities of drift needed to result in such effects.

Rates and application scenarios which exceed levels of concern of chronic risk, acute risk, restricted use, or endangered species risk for terrestrial organisms are summarized in Table 17.

Table 17. Terrestrial Risk Summary

<table>
<tr><th>Level of Concern Exceeded</th><th>Acute Risk (AR)</th><th>Restricted Use (RU)</th><th>Endangered Species (ES)</th><th>Chronic Risk (CR)</th></tr>
<tr><td>small mammals</td><td>yes</td><td>yes</td><td>yes</td><td>yes</td></tr>
<tr><td colspan="5">AR: Rates ≥ 3.0 x 2 applications (walnuts, citrus, avocados, almonds, cherries)
RU: Rates ≥ 3.0 x 1 APPL. or ≥ 2.0 x 2 APPL. or ≥ 1.5 x 3 APPL. (all crops except carrots, peanuts, sorghum)
ES: Rates above 1.2 lb ai/A (all crops)
CR: Rates above 1.6 lb ai/A x 1 APPL. Or 1.0 lb ai/A x 2 or 0.5 lb ai/A x 3 APPL.(all crops)</td></tr>
<tr><td>birds</td><td>yes</td><td>yes</td><td>yes</td><td>yes</td></tr>
<tr><td colspan="5">AR: Rates of 4.5 lb ai/A applied twice (walnuts, citrus, avocados, almonds, cherries)
RU: Single applications at ≥ 3.0 lb ai/A, two or three applications at ≥ 1.6 lb ai/A (all crops except carrots, peanuts, sorghum)
ES: Single applications above 1.5 lb ai/A or multiple applications above 1.0 lb ai/A (all crops)
CR: Any application at rates above 0.5lb ai/A (all crops)</td></tr>
<tr><td>non-target insects</td><td>Honeybees- no</td><td>NA</td><td>yes-spiders if present</td><td>NA</td></tr>
<tr><td colspan="5">AR and ES: Beneficial arachnids. However, endangered spiders are primarily cave dwellers (Harvestman)</td></tr>
<tr><td>terrestrial plants</td><td>no</td><td>NA</td><td>yes</td><td>yes-necrosis</td></tr>
<tr><td colspan="5">Adverse effect to endangered plants (particularly juveniles) is possible based on 1 incident and label warnings</td></tr>
</table>

Aquatic Risk Characterization

The standard method for assessing aquatic risk results in concern for potential chronic effects to freshwater fish and invertebrates. Although EFED's criteria for acute risk to freshwater invertebrates and estuarine fish were not exceeded, the assessment suggests that adverse effects could occur in shallow bodies of water that are not represented by standard scenarios. No data are available to assess risk to estuarine and marine organisms. Also, as noted for the terrestrial risk assessment, an element of uncertainty is added to the aquatic risk assessment by the lack of application intervals on propargite labels. The time between applications could have an impact on exposure levels used to assess aquatic risk.

Chronic toxicity effect levels were low for freshwater aquatic invertebrates and fish. Given the persistence characteristics of propargite, the potential for chronic effects is most likely if residues reach aquatic habitats in concentrations exceeding 9-16 ug/L *(Daphnia magna* NOEC = 9 ug/L; fathead minnow NOEC =16 ug/L). Chronic LOCs for invertebrates were exceeded in three of the five scenarios in Tier II modeling simulations. There were no data available to assess potential chronic effects to estuarine and marine organisms.

In aerobic and anaerobic aquatic metabolism studies, propargite half-lives were 38 and 46 days, respectively. These data, along with hydrolysis half-lives of 75 and 120 days at pH 7 and 5, respectively, suggest that propargite will be relatively persistent in aquatic environments. Any impact on aquatic life, then, is likely to be greatest where neutral to acidic conditions predominate (pH 5.0 to 7.0). This could include tributaries fed by acid drainage or that receive runoff from watersheds where highly organic soils predominate. Because aqueous photolysis of residues is not an important process, water clarity is not likely to play an important role in degradation. Because of its high affinity for soil, propargite has the potential to move into aquatic habitats through runoff or wind erosion of soil particles. Other offsite transport is possible by spray drift from aerial, airblast, or ground boom applications. Given the moderate to slow degradation rates for metabolism and photolysis, and the high K_{oc} values, propargite is likely to partition to sediment and organic material found in surface waters. Thus, impacts to benthic- dwelling organisms from prolonged exposure to contaminated sediments must be a consideration when characterizing long-term risk potential for exposed aquatic areas. Toxicity to these organisms from residues on sediment is uncertain because relevant data are not available.

Though propargite is highly toxic to all fish and invertebrate species tested (96 hour LC_{50} values for 7 aquatic species were below 168 ug/L), the RQs calculated from EECs derived from Tier II simulations suggest little potential for acute risk to fish or invertebrates. However, several RQs ranged between 0.2 and 0.5 suggesting that exposure in small, shallow water bodies (i.e., those not represented by EFED's standard aquatic risk scenario) could result in adverse effects to organisms present. Acute restricted use exceedences (RQ=0.2) for fish and invertebrates are noted for a number of application scenarios. For endangered aquatic species, all modeled scenarios exceeded Agency acute levels of concern (RQ>0.05). Table 18 summarizes the various rates and application scenarios which may lead to presumptions of risk for aquatic organisms.

Table 18. Aquatic Risk Summary

<table>
<tr><th>Level of Concern Exceeded</th><th>Acute Risk (AR)</th><th>Restricted Use (RU)</th><th>Endangered Species (ES)</th><th>Chronic Risk (CR)</th></tr>
<tr><td>freshwater fish</td><td>no</td><td>yes</td><td>yes</td><td>yes</td></tr>
<tr><td colspan="5">AR: Not predicted
RU: Single applications at 4.5 lb ai/A and multiple applications ≥ 1.5 lb ai/A for certain crop sites
ES: Single at >3.0 lb ai/A (nut crops, citrus, cherries, avocados) and multiple at ≥ 1.5 lb ai/A (most crops)
CR: Three applications at 1.6 lb ai/A (cotton, nut trees, avocados, conifer trees)</td></tr>
<tr><td>estuarine fish</td><td>yes</td><td>yes</td><td>yes</td><td>no data</td></tr>
<tr><td colspan="5">AR: Three applications at 1.6 lb ai/A (cotton, nut trees, avocados, conifer trees)
RU: Multiple and possibly single applications at 1.5 lb ai/A (most crop uses)
ES: Multiple applications above 1.5 lb ai/A (most crop sites)
CR: Possible, however no chronic endpoint data is available</td></tr>
<tr><td>freshwater invertebrates</td><td>yes</td><td>yes</td><td>yes</td><td>yes</td></tr>
</table>

HAR: Not predicted **RU:** Multiple applications above 1.5 lb ai/A and possibly single applications >3.0 lb ai/A (most crop uses) **ES:** Multiple applications above 1.5 lb ai/A and possibly 1 application > 3.0 lb ai/A (all crops except alfalfa, carrots, clover, and possibly sorghum) **CR:** Multiple applications (2-3) at ≥ 1.6 lb ai/A (crop area specific, see corn and cotton EECs)				
estuarine invertebrates	no	yes	yes	no data
HAR: Not predicted using clam EC50 of 80 ug/L **RU & ES:** 2-3 applications at ≥ 1.6 lb ai/A (all crops except alfalfa, carrots, clover, and possibly sorghum) **CR:** Possible , however no chronic endpoint data is available				
aquatic plants	yes	NA	possible	NA
HAR: Only one species showed 50% effect at maximum levels predicted for corn, walnut and cotton				

These exposure scenarios assume a maximum drift component of 5% of the application rate for airblast and aerial application. They also assume that receiving waters will contain a volume of 20 million liters, which may not represent shallower, ecologically-significant habitats which might surround crop areas where propargite is used. In smaller volume habitats or aquatic habitats with larger watershed to volume drainage ratios, adverse acute effects to aquatic organisms could occur. In the registrant's non-guideline terrestrial field runoff and spray drift studies mentioned previously, residue concentrations of up to 120 ug/L were reported in ponds. The studies were conducted with 6 ponds ranging in size from 0.4 to 3.0 acres and watersheds ranging from 5.3 to 52 acres. All applications were aerial and may have included higher than typical rates for the corn, cotton, and citrus crops. However, residues were sometimes higher than predicted by Tier II modeling. NAWQA reports of monitored propargite residue levels (maximum 20 ug/L) in streams and rivers do not exceed acute toxicity levels (74 to 118 ug/L). However, a small number of residue readings do approach (one exceeds) chronic toxicity concern levels (9-16 ug/L) and these values are comparable to Tier II modeling predictions for a typical farm pond. There is some uncertainty as to how long these levels had already existed in the monitored sites. There is also uncertainty due to lack of data on flushing rates of the respective tributaries, and also regarding the initial peak levels these detections may represent.

Sensitivity to propargite among various types of aquatic plants varied by an order of magnitude. Certain groups of aquatic plants, e.g., the saltwater diatom *Skeletonema costatum* (EC50 = 19 ug/L) and the freshwater algae *Navicula peliculosa* (EC50 = 106 ug/L), were highly sensitive. Other species showed lower sensitivity.

Drinking Water Characterization

The HED drinking water level of chronic concern is 0.2 ug/L. The level is exceeded by Tier II modeling with index reservoir and cropped area factors included. While the models used to derive these values are not validated, the recent inclusion of the index reservoir and cropped area factors have made the results more relevant for drinking-water assessments. The index reservoir and percent cropped area are described in appendices.

Monitoring data described in the risk assessment include a maximum concentration of 20 ug/L and a maximum time-weighted annual concentration of 1.24 ug/L. EFED cannot assume with confidence that these values are the highest that could be detected with more extensive surface-water monitoring. As noted in the ecological risk assessment, the interval between applications, which is not specified on propargite labels, could have an effect on maximum residues detected in surface water monitoring programs. However, monitoring values are within the same order-of-magnitude as the modeling results recommended for the exposure assessment.

The areas of highest drinking water concern are predicted to be rural sites near areas where crops are grown and where propargite is applied. In the USGS NAWQA monitoring program, propargite was detected in 175 of 5196 surface water samples for the period 1991 to 1995, with a maximum concentration of 20.0 ug/L. Out of the total 5196 samples, propargite was detected in 53 of 1000 samples taken from agricultural streams, with one sample having a maximum concentration of 20.0 ug/L. The next highest concentration was 3.7 ug/L. Propargite was detected in only 1 of 327 urban streams, at a concentration of 0.015 ug/L. Propargite was detected in 8 of 245 samples taken from 14 integrator sites on large streams and rivers, with a maximum concentration of 2.0 ug/L.

The number of Tier II modeled aquatic scenarios (five total) is small when compared to the large number of potential application scenarios (e.g. other crops, geographical areas, and aquatic habitat types). This adds uncertainty to the aquatic risk assessment.

Distribution of Potentially Affected Habitats and Species Groups

The following summary of potential major exposure areas for propargite usage is based on EPA Quantitative Usage Analysis data prepared in 1999. Maximum usage estimates were used to allow for potential shifts in market usage of propargite products. Terrestrial species expected in various crop scenarios were drawn form Wildlife Utilization of Croplands. Gusey, William F. And Z. Maturgo, 1973. The purpose of this portion of the document is not to categorize every species type that could conceivably be exposed to the large number of potential propargite use sites, but instead to provide a general overview of the species types and aquatic habitats which might be exposed from crop and non-crop use sites for propargite and to categorize which areas of the country (where possible to predict) may be most heavily impacted by the type of use pattern.

Table 19. Terrestrial Wildlife Utilization and Aquatic Habitats Potentially Exposed

Crop Groups for Propargite	**Maximum Acreage**	**Major States-**	**Species or Aquatic Habitats Common to Usage Locations**
Non bearing Berry Crops (strawberry, raspberry, boysenberry, etc)	15,900	CA	**Terrestrial**: waterfowl, quail, pheasant, crows, blackbirds, songbirds(finches, robins, starlings, cedar waxwing), grouse, rabbits, deer, racoon, woodchuck, skunk, opossum, **Aquatic**: FW Marshes, ponds, and streams:
Non-bearing Citrus Crops (orange, grapefruit, lemon, tangelo, tangerine, other)	73,700	FL, CA, AZ	**Terrestrial:** doves, roadrunner, screech and horned owls, hummingbirds, gilded flicker, ladderbacked woodpecker, western kingbird, verdin, cactus wren, mockingbird, thrashers, orioles, cardinals, grosbeaks, goldfinch, linnet, deer, raccoon **Aquatic**: Irrigation canals, rivers, freshwater springs, some estuaries
Avocado Figs Dates(nonbearing) Grapes Currants (non-bearing)	6000 No estimate No estimate 249,000 No estimate	CA	**Terrestrial**: grouse, pheasant, songbirds(bluebird, cardinal, catbird, flicker, blue jay, kingbird, magpie, mockingbird, phainopepla, robin, fox sparrow, thrashers, thrushes, vireos, cedar waxwing, woodpeckers), hawks, fox, marmot, porcupine, rabbit, deer, quail, flicker, racoon, opossum, partridge **Aquatic:** Streams, rivers. irrigation waters
Non-bearing Fruit trees in orchards (apple, apricots, pears, cherry (post harvest), peach, plum, prune, quince, nectarine)	<298,000	NY, WA, MI, MA, CA, ME	**Terrestrial:** Doves, songbirds (blackbirds, grosbeaks, cedar waxwings, robins, starlings , western tanager, brown thrasher, titmouse, orioles, jays, finches, bluebird, sparrows, phobe, kingbird, flycatchers, wood and varied thrushes, mockingbird, warblers (many sp.), wrens, swallows, grackles, chimney swift, hummingbirds, woodpeckers, etc), valley quail, partridge, ruffed grouse, pheasant, wild turkey, rabbit, deer, fox, bear, opossum, raccoon, squirrel **Aquatic**: FW streams, rivers, ponds, marshes, and lakeshore
<u>Bearing Nut Trees:</u> Almonds, Pecans, walnuts <u>Non Bearing Nut trees:</u> Hazelnut, pistachio, macadamia	352,000	CA, AZ, GA Nation-wide	**Terrestrial:**No data located **Aquatic**: Streams, irrigation canals, and rivers
Potatoes (Pacific Northwest)	84,000	WA, ID	**Terrestrial**: pheasant, rabbit, deer, songbirds, dove **Aquatic**: Irrigation canals, streams, rivers, bogs, marshes

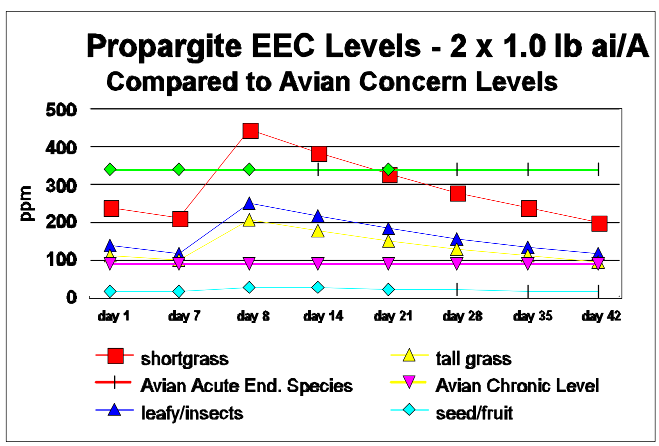
Beans, Dry	180,000	CA, ID, WA, OR (Label says "West of Rockies")	**Terrestrial:** turkey; California, scaled, valley, and bobwhite quails, songbirds(buntings, larks, pigeon, sparrows, roadrunner, grosbeak, ground doves, pipits), shorebirds, coots, ducks, geese, crows, doves, sandhill crane, prairie chicken, partridge, owls and hawks(feeding on field rodents), coyote, muskrat, gray squirrel, groundhog, elk, skunk, rabbits, raccoon, opossum, woodchuck, deer,
Cereal Grain Crops (corn, sweet corn, sorghum)	556,000	GA, CO, TX, AZ, KY, VA, MN, MT, NC, ND, CA, NY, NC, PA, TX, AR, MS, LA, KS, MO, NE, SD, TN, OK,	**Terrestrial:** Rabbits, pheasant, pigeon, doves, ducks(black, canvasback, mallard, pintail, ringnecked, shoveler, teal, wood), coots , rails, egrets, herons, ibis, and gallinules(rice fields), geese, swan, songbirds(blackbirds, towhees, thrasher, sparrows, junco, magpie, snow buntings, grosbeaks, jays, cardinal, bobolink, meadow and horned lark),woodpeckers (eat seeds), ravens, grackles, crows, partridge, grouse, scaled and bobwhite quail, sandhill crane, Attwater prairie chicken(TX), deer, elk, antelope, wild turkeys, gray, fox and ground squirrel, woodchuck, fox, porcupine, coyote, moles, whitefooted and pocket mice, kangaroo rat, muskrat, javelina(TX) **Aquatic**: Streams, rivers, ponds, prairie potholes, marshes, saltmarshes, estuarine bays
Cotton	372,000	TX, CA, TN, AZ, AR, MS	**Terrestrial**: Deer, turkey, squirrel, rabbit, quail, dove, pheasant, prairie chicken, raccoon, opossum, sandhill crane, antelope **Aquatic**: Rivers, streams, marshes possibly estuaries
Grass and Non-grass Forage Crops (alfalfa, clover)	>75,000	CA, ID, MT, NV, OR, UT, WA, WY	**Terrestrial**: Pheasant, mourning dove, partridge, quails, ducks, Canada geese, elk, deer, antelope, grouses, prairie chickens, rabbits, turkey, songbirds, cranes, skunk, small mammals, marmot, ground squirrels **Aquatic:** Ponds, bogs, marshes, streams, prairie potholes
Hops	32,000	OR, WA	**Terrestrial**: Pheasant, quail, songbirds, doves, owls and hawks feeding on small mammals **Aquatic**: NW rivers, streams, bogs
Mint	31,000	ID, MT, NV, UT, OR, WA	**Terrestrial**: Pheasant, quail, doves, songbirds, partridge **Aquatic**: Streams and possibly rivers
Peanut	46,000	GA, AL, NC, FL, VA	**Terrestrial**: bobwhite, waterfowl, dove, songbirds, cottontail rabbit, squirrels, raccoon, turkey, opossum, **Aquatic:** shallow rivers, streams, FW and SW marshes
Sugar beets (for seed)	3,000	OR, TX, CA	**Terrestrial**: pheasant, dove, partridge, quail, ducks, Canada goose **Aquatic:**Rivers, small tributaries
Carrots	2,000	CA	**Terrestrial**: rabbits, quail, songbirds, pheasant **Aquatic:**Rivers, small tributaries

Jojoba		CA	No information located on exposed species
Soybean	252,000	MN	**Terrestrial:** pheasant, ducks, geese, jack and cottontail rabbits, squirrel (many other species in other soybean states) **Aquatic:** Rivers ,streams, ponds, marshes, bogs
Woodlands	248,000	CA, OR	**Terrestrial**: No definitive state surveys were reviewed **Aquatic**: Streams, small rivers, wooded wetlands
Ornamentals-Nurseries, Parks, Cemeteries, Landscape, etc	No estimate	Nation-wide	**Terrestrial**: Many types of songbirds, hummingbirds, small and large mammals, **Aquatic:** Streams, rivers, marshes, ponds, lakes, estuaries
Roses-Commercial		CA	No information located - limited acreage use
Tree farms-coniferous		Assumed nationwide	**Terrestrial**: chickadee, titmouse, nuthatches, brown creeper, kinglets, pine warbler, other warblers except ground warblers, pine sicken, cedar bird, bohemian waxwing, pine grosbeak, crossbills, pine FICA, grackles, crow, raven **Aquatic:** streams and ponds

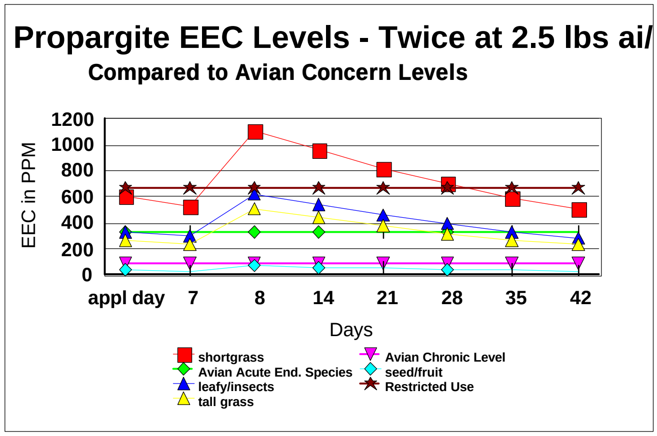
Duration of and Magnitude of Risk

The duration and extent of propargite exposure may be determined by a number of factors including the application scenarios chosen by the applicator, weather conditions, whether wildlife are likely to be attracted to or present in the crop site, and the dietary preferences of those species that are exposed. The following graphs depict a conservative estimate of the duration and potential level of exposure using 7 day application intervals, 30 day foliar dissipation halflife values, and maximum expected vegetation/insect residue levels for 1.0 to 4.5 lbs ai/A multi application scenarios. Only avian risk presumption levels are presented in the following charts. They appear as straight lines passing through the increasing and declining residue levels.

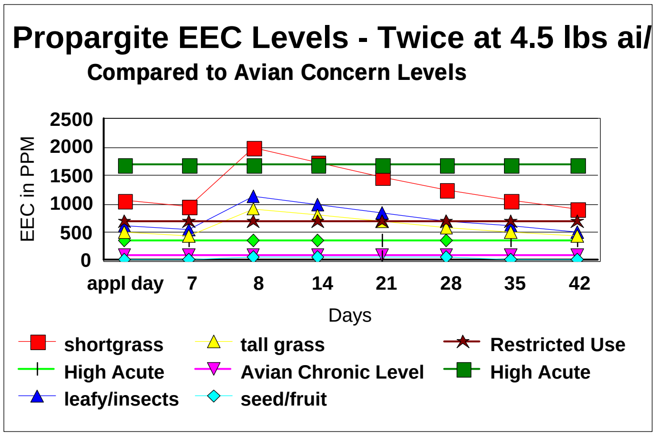
At at a rate of 1.0 lbs ai/A applied twice with a 7 day interval, propargite residue levels exceed avian endangered species risk presumption levels (340 ppm) on shortgrass for approximately 14 days following the second application. Avian chronic reproduction risk presumption levels(85 ppm) are exceeded by shortgrass, leafy and insect and range grass residue levels following the first application and continue to exceed for over 8 weeks. Birds that are primarily seed eaters may not be at risk under this scenario.



At a 2.5 lb application rate applied twice residue levels on short grass exceed restricted use criteria levels (680 ppm) for birds. All vegetation and small insect residue levels remain near or above endangered species risk presumption levels for approximately 28 days. Chronic reproductive risk levels are exceeded well past the 42 day period depicted in this graph for diets consisting of vegetation and insects. Again strictly seed eating birds may not be significantly at risk.



At rates of 4.5 lbs ai/A applied twice propargite residue levels actually exceed acute risk presumption levels for birds(1700 ppm) for a period of about 8 days. Endangered species acute risk levels (340 ppm) and chronic reproductive risk levels (85 ppm) are exceeded well past the initial application date (> 45 days) on insects and vegetation.. Seed eaters may also be chronically effected after a second application at this rate.



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Appendix 1

GENEEC Input Parameters for Propargite*

Chemical Specific Property	Value	Reference
Drift Approximation as a % of Application Rate	5% (aerial); 1% (ground)	Draft Guidance Document for use in Modeling. Page 7, Sept. 9, 1999
Maximum Application Rate	4.5 lb ai/A	Label
Number of Applications	2	Label
Application Interval	7 days	Label
Aquatic Photolysis Half Life	140 days	MRID 40358402
Aerobic Soil Metabolism Half Life	504 (3x168) days	MRID 43851402
Aerobic Aquatic Half Life	114 (3x38) days	MRID 42688801
Organic Carbon Partitioning Coefficient (K_{oc})	2963 mL/g	MRID 42908402
Solubility in Water	0.62 mg/L	EFED one-liner
Hydrolysis (@pH 7)	75 days	MRID 40358401

*Input parameters selection based on the document "Guidance for chemistry and management practice input parameters for use in modeling the environmental fate and transport of pesticides." Prepared by the EFED Water Quality Tech Team, September 7, 1999.

GENEEC predicted concentrations of propargite -4.5 lb ai/A x 2 aerial applications to walnuts.

Exposure Endpoints	**Propargite concentrations-*u*g/L**
Peak	69.01
4-day average	63.59
21-day average	40.45
56-day average	22.81

PRZM/EXAMS model input parameters for propargite*.

Chemical Specific Property	**Value**	**Reference**
Molecular Weight	350.5	EFED one-liner
Solubility	0.6 mg/L	MRID 42319303
Henry's Law Constant	3.3E-8 atm.m^3/mole	MRID 41003603
Vapor Pressure	4.49E-8 mm Hg @ 25^0C	MRID 41003603
Acid hydrolysis half-life	120 days	MRID 40358401
Neutral hydrolysis half-life	75 days	MRID 40358401
Alkaline hydrolysis half-life	3 days	MRID 40358401
Aqueous photolysis half-life	140 days, 0.00495/day, 2.06E-4/hr	MRID 40358402
Aerobic soil Metabolism half-life	168 days, 4.13E-3/day, 1.72E-4/hr	MRID 43851402

Aerobic Aquatic metabolism half-life	38 days, 1.82E-2/day, 7.6E-4/hr	MRID 42688801
Anaerobic aquatic Metabolism half-life	47 days, 1.47E-2/day, 6.14E-4/hr	MRID 431139401
Soil Partition Coefficient (Kd)	107 mL/g	MRID 42908402
Crops	citrus, corn, cotton, potatoes, and walnuts	Label
Maximum Application Rate of Active Ingredient/Acre	citrus: 3.0 lb, corn: 1.6 lb cotton: 1.6 lb, potatoes: 2.0 lb walnuts: 4.5 lb ai/A	1999 registrant provided information and 1998 labels
Number of Applications/Days Between Applications	citrus: 2/21, corn: 2/7, cotton: 3/7 potatoes: 2/7, walnuts: 2/7	1999 registrant provided information and 1998 labels
Time of Application	citrus: fall, corn: summer cotton: summer, potatoes: summer walnuts: mid summer	1999 registrant provided information and 1998 labels
Method of Application	aerial and ground	1999 registrant provided information and 1998 labels

** Input parameters selection based on the document "Guidance for chemistry and management practice input parameters for use in modeling the environmental fate and transport of pesticides." Prepared by the EFED Water Quality Tech Team, September 7, 1999.

SCIGROW input parameters for propargite

Chemical Specific Property	Value	Reference
Number of Applications	2	Label
Application Interval	7 days	Label
Maximum Application Rate	4.5 lb ai/A	Label
Aerobic Soil Metabolism Half Life	168 days	MRID 43851402
Organic Carbon Partitioning Coefficient (K_{oc})	31061 mL/g (median)	MRID 4290802

SCIGROW OUTPUT FILE

```
RUN No. 1 FOR omite INPUT VALUES
--------------------------------------------------------------------
 APPL (#/AC)  APPL.   URATE    SOIL      SOIL  AEROBIC
 RATE          NO.  (#/AC/YR)   KOC       METABOLISM (DAYS)
--------------------------------------------------------------------
   4.500      2       9.000    31061.0      168.0
GROUND-WATER SCREENING CONCENTRATIONS IN PPB
--------------------------------------------------------
               .006000
--------------------------------------------------------
A= .000  B= .000  C=  .000  D= .000  RILP= .000
F= .000  G= .000  URATE= 9.000  GWSC= .006000
```

Appendix 2

Ecological Effects Data Summary

Toxicity to Terrestrial Animal
Based on the results for the avian acute/subacute dietary toxicity tests, Propargite is found to practically non-toxic avian species on an acute and subacute oral dietary toxicity basis. The results for these tests are tabulated below.

Oral Acute/Subacute Avian Toxicity Dietary Studies:

Table 1-Avian Acute/Subacute Toxicity

Species	% ai	LC_{50} (ppm)/ LD_{50} (mg/Kg)	Toxicity Category	MRID No. Author/ Year	Study Classification
Mallard duck *(Anas platyrhynchus)*	88%	LD_{50} >4640	practically non-toxic	43414529 A.G. Murray *et al* (1992)	Core
Northern bobwhite quail *(Colinus virginianus)*	88	LC_{50}=3401	practically nontoxic	00113471/Fink/ (1977)	Core
Northern bobwhite quail *(Colinus virginianus)*	57	LC50>5620	practically nontoxic	00076407	Core
Mallard duck *(Anas platyrhynchus)*	88	LC_{50} >4640	practically nontoxic	00052454/Fink/ (1974)	Core

Results of avian reproductive toxicity testing with Propargite are tabulated below

Table2-Avian Reproduction

Species	% ai	NOAEC/ LOAEC (ppm)	Endpoints Affected	MRID No. Author/Year	Study Classification
Northern bobwhite quail *(Colinus virginianus)*	85	LOAEC=288 NOAEC=84.7	see paragraph below	410417-02 J. B. Beavers *et al*(1988)	Core
Mallard duck *(Anas platyrhynchus)*	85	>84.7=LOAEC 43.2=NOAEC	see paragraph below	410417-01 J. B. Beavers *et al(1988)*	Core

Chronic effects to birds included reductions in mean numbers of eggs laid/female(mallard and bobwhite), viable embryos (mallard), live 3 wk embryos (mallard), hatch success (mallard), hatchling survival and weight(mallard and bobwhite), adult body weight change (mallard) were affected at 288 ppm. In mallard slight reductions were also observed at 84.7 ppm adult body wt change (bobwhite and mallard), eggs laid/female, live embryos, and hatchling survival, thus the NOEL = 43.2 ppm for these parameters. Corresponding application scenarios that might equate to these levels could include single or multiple applications at rates below 1.5 lb ai/acre.

Mammals, Acute and Chronic

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use pattern and pertinent environmental fate characteristics. In most cases, rat or mouse toxicity values obtained from the Agency's Health Effects Division (HED) substitute for wild mammal testing. Based on a laboratory rat LD50 value of 2639 mg/kg, propargite is practically non-toxic to small mammals on an acute oral basis. Based on the laboratory NOAEL value of > 400 ppm, propargite is toxic to small mammals on a chronic basis. These toxicity values are reported below.

Table 3-Mammalian acute toxicity

Species	% ai	Test Type	Toxicity Value	Affected Endpoints	MRID
Laboratory rat *(Rattus norvegicus)*	90.3	Rat acute oral LD_{50}	LD50=2639 mg/kg	None	42857001

Table 4-Mammalian chronic toxicity

Species	% ai	Test Type	Toxicity Value	Affected Endpoints	MRID
Laboratory Rat	87.2	Chronic Toxicity	LOAEL=800 ppm NOAEL=400ppm for females LOAEL=400 ppm NOAEL=80 ppm for males	Body wt in females and males and increased mortality in male rats	41750901
Laboratory rat *(Rattus norvegicus)*	87.2	Reproductive toxicity to offspring	LOAEL=800 ppm NOAEL= 400 ppm	Decrease pup and adult wt.	41352401

Insects

Based on a honey bee acute contact test LD_{50} of 15 *ug* ai/bee, propargite is practically non-toxic to bees on an acute contact basis (Kopwalski, 1993). The results of Propargite testing using the honey-bee are tabulated below:

Table 5-Non-target insect acute contact toxicity

Species	% ai	LD50 (µg/bee)	Toxicity Category	MRID/ Author/ Year	Study Classification
Honey bee *(Apis mellifera)*	88.3%	15ugai/bee	Practically non-toxic	43185001/Kopwalksi/ 1993	Core

Toxicity to Aquatic Animals

The results of acute testing show that propargite is categorized as highly toxic to cold-water, warm-water fish species, and invertebrate species. Results of freshwater animal acute toxicity testing are tabulated below.

Table7-Freshwater Animal Acute Toxicity

Species	% ai	EC50/ LC50 (ug/L)	Toxicity Category	MRID No. Author/Year	Study Classification
Waterflea *(Daphnia magna)*	76.2	48 hr EC50= 74	Highly toxic	43759002 Davis (1995)	Core
Waterflea *(Daphnia magna*	100	48 hr EC50= 91	Highly toxic	00068752	Core
Rainbow trout *(Oncorhynchus mykiss)*	76.2	LC_{50}= 143	Highly toxic	43759001/Davis/ (1995)	Core

Species	% ai	EC50/ LC50 (ug/L)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout *(Oncorhynchus mykiss)*	tech	LC_{50}= 118	Highly toxic	0066498/Kuc/ (1977)	Core
Rainbow trout *(Oncorhynchus mykiss)*	30	LC50=445	Highly toxic	00043552	Supl.
Bluegill sunfish *(Lepomis macrochirus)*	88	LC_{50}= 167	Highly toxic	0066498/Kuc/ (1977)	Core
Bluegill sunfish *(Lepomis macrochirus)*	57E	LC50= 31	Highly toxic	00112368/1966	Supl.
Carp, *Cyprinus carpio*	35EC	48 hr LC50=330 ppb	Highly toxic	00090718	Supl.

The results if the Freshwater Aquatic Invertebrate Life-Cycle Toxicity and Fish Early Life-Stage Toxicity test are shown below. Based on the tabulated results, propargite is found to be toxic to freshwater invertebrates and fish on a chronic basis at low concentrations.

Table 8-Freshwater Aquatic Invertebrate Life-Cycle Toxicity and Fish Early Life-Stage Toxicity

Species	% ai	NOAEC LOAEC (ug/L)	Endpoints Affected	MRID No. Author/Year	Study Classification
Waterflea *(Daphnia magna)*	88	9 to 14	reproduction	00126738/Forbis/1983	Core
Fathead minnow *(Cyprinus carpio)*	88	16 to 28	growth, survival, day to mean hatch	00126739/Forbis/1983	Core

The results show that Propargite is categorized as highly toxic to estuarine/marine fish on an acute basis. The results of acute toxicity testing with estuarine/marine species are tabulated below.

Table 9-Estuarine/Marine Organism Acute Toxicity

Species	% ai.	LC50/EC50 (ug/L)	Toxicity Category	MRID No. Author/Year	Study Classification
Sheepshead minnow (*Cypridon variegatus*)	87.4	96 hr LC_{50} =60	Very Highly Toxic	405140-01/1987/ Surprenant	Core
Quahog clam, *Mercernaria m.*	87.4	48 hr EC50=80	Highly toxic	(40431601)/1977 Davis	Core
Grass shrimp *Palaemonetes pugio*	87.4	96 hr LC50=101	Highly toxic	(00112395)/1972/ Davis	Core

Fiddler crab, *Uca pugilator*	tech.	96 hr LC50>500	(00112395)/1971/ Davis	Supplemental

Toxicity to Terrestrial and Aquatic Plants

The most sensitive monocot was found to be sorghum with an EC25 > 2.45 lb ai/A and NOAEL < 2.45 lb ai/A. The most sensitive dicot was found to be radish with an EC25> 2.45 lb ai/A and an NOAEL < 2.45 lb ai/A. The results for these tests are tabulated below.

Table-10-Non-target Terrestrial Plant Seedling Emergence/Vegetative Vigor Toxicity (Tier I)

Species	**% ai**	**EC25 (lb ai/A)**	**Endpoint Affected**	**MRID No. Author/Year**	**Study Classification**
Monocots- sorghum, corn, oat, wheat, onion Dicots- carrot, cucumber, radish, soybean, sunflower, tomato	88	>2.45 lb ai/A	no observed growth effects	43848801 43848802 (Aufderheide and Kranzfelder)	Core

The Tier II results indicate that the freshwater diatom is the most sensitive non-vascular aquatic plant. Aquatic plant testing (Tier II) results are tabulated below.

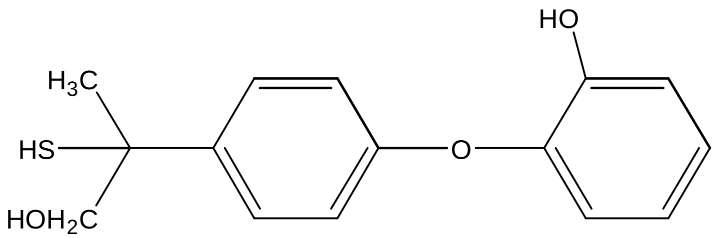
Table- 11-Non-target Aquatic Plant Toxicity (Tier II)

Species	% ai	EC_{50} (ug/L or ppm)	NOAEL (ug/L or ppm)	MRID No. Author/Year	Study Classification
Vascular Plants					
Duckweed ,*Lemna gibba*	76.2	75 ppm	28	43885805/Davis/1995	Core
Nonvascular Plants					
Green algae *Kirchneria subcapitata*	88.2	>105.5	4.3	43414542 D.E. Brock (1992)	Core
Freshwater diatom *Navicula pelliculosa*	76.2	106 ug/L	99	43885807/Davis/ 1995	Core
Blue-green algae *Anabaena flos-aquae*	76.2	>101 ppm	101	43885803/Davis/ 1995	Core
Salt-water Diatom *Skeletonema costatus*	76.2	19.4 ug/L	1.27	43885806/Davis/ 1995	Core
Freshwater Green Alga *Selenastrum capricornutum*	76.2	66.2 ug/L	5	43885804/Davis/ 1995	Core

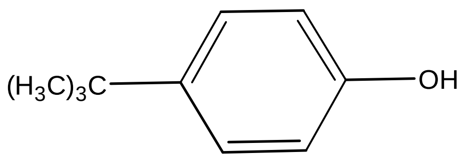
APPENDIX 3

Propargite Parent and Degradate Structures

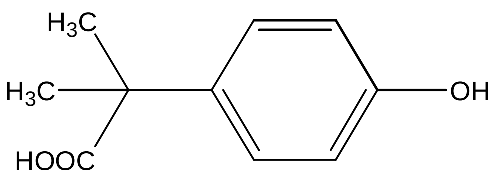
The following figures on page 45 depict chemical structures for parent propargite and the known degradates. In addition a degradation pathway is shown following the degradate structures.



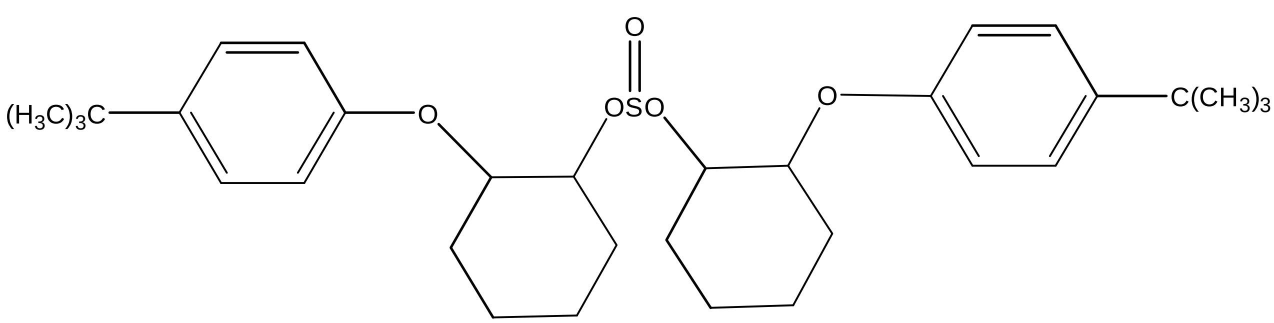
OMT-B
2,2-dimethyl-2-(4'-hydroxy-cyclohexoxy) phenyl)ethanol



PTBP
p-tertiarybutylphenol

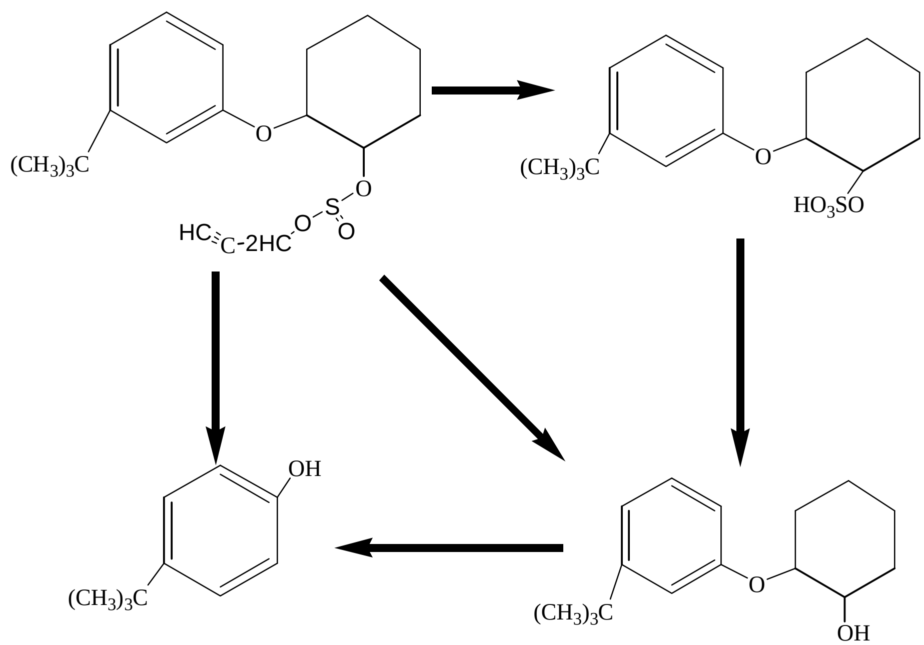


PTBP-Acid
2-(4-hydroxyphenyl)-2-methyl propionic acid



BGES
bis-[2-(4-(1,1-dimethylethyl)phenoxy)cyclohexl]sulfite

DEGRADATION PATHWAY



Appendix 4:

Table A1. Status of environmental fate data requirements for propargite

Guideline #	Data Requirement	MRID #	Classification	Is data requirement satisfied?
161-1	Hydrolysis	40358401	acceptable	yes
161-2	Photodegradation - water	40358402	acceptable	yes
161-3	Photodegradation - soil	40358402 42319301 42319307	acceptable supplemental[1] supplemental[1]	yes
161-4	Photodegradation - air		waived[2]	yes
162-1	Aerobic soil metabolism	41003601 42786301 43851401	supplemental[3] supplemental[3] acceptable	yes
162-2	Anaerobic soil metabolism	41003602	acceptable	yes
162-3	Anaerobic aquatic metabolism	43139401	acceptable	yes
162-4	Aerobic aquatic metabolism	42688801	acceptable	yes
163-1	Leaching, adsorption/desorption	40431602 41449202 41449203 41449204 41449205 41449206 41449207 42908401 42908402	supplemental[4] supplemental[4] supplemental[4] supplemental[4] supplemental[4] supplemental[4] supplemental[4] acceptable acceptable	yes
163-2	Volatility - lab		Waived[2]	yes
163-3	Volatility - field		Waived[2]	yes
164-1	Terrestrial field dissipation	40969501 41307301 41325901 41432501 41731501 41966001 41966002	supplemental acceptable supplemental supplemental acceptable supplemental supplemental	yes
164-2	Terrestrial aquatic dissipation	Not submitted [6]		
164-3	Forestry dissipation	Not submitted[7]		
165-4	Bioaccumulation(in fish)	40494001 40916601	acceptable	yes
201-1	Droplet size spectrum	(Not submitted)[8]		

Guideline #	Data Requirement	MRID #	Classification	Is data requirement satisfied?
202-1	Drift field evaluation	(Not submitted)[8]		

[1] MRIDs 42319301 and 42319307 were supplemental to MRID 40358402.
[2] EFED concurs with the waiver request due to the low vapor pressure of propargite
[3] MRIDs 41003601 and 42786301 were not acceptable due to soil type and unexplained high rate of soil binding in studies respectively.
[4] Soils were autoclaved prior to initiation of test. It is believed that autoclaving soils changes their physical and chemical properties and possibly
affecting their adsorption behavior.
[6] Aquatic dissipation data are needed for aquatic uses to make a complete environmental fate assessment in an aquatic environment. However, presently there appears not to be an aquatic use for propargite. The cranberry use was canceled due to tolerance concerns (SMART meeting 20 October 1998). Therefore, an aquatic dissipation study is not needed at this time.
[7] Forestry dissipation data are needed for forestry uses to make a complete environmental fate assessment in forest environments. However, presently the fruit orchard and Christmas tree site uses are not considered a forestry use pattern. Therefore, a forestry dissipation study is not needed at this time.
[8] There are aerial applications for propargite. Therefore, to understand the environmental fate of propargite, droplet size spectrum and drift field evaluation data may be needed.

Table A2. Status of ecological effect data requirements for propargite.

Guideline #	Data Requirement	MRID #	Classification	Is data requirement satisfied?
71-1	Avian acute oral LD_{50}	00052455	Core	yes
71-2	Avian subacute dietary LC_{50} bobwhite quail mallard duck	00113471 00052454	Core	yes
71-4	Avian reproduction bobwhite quail mallard duck	41041702 41041701	Core Core	yes
72-1	Freshwater fish acute LC_{50} rainbow trout bluegill sunfish	43759002 00112368	Core Core	yes yes
72-2	Freshwater invertebrate acute LC_{50} (daphnia)	43759001	Core	yes
72-3a	Estuarine/marine fish acute LC_{50} (sheepshead minnow)	40514001	Core	yes
72-3b	Estuarine/marine acute invertebrateEC_{50}	00112395	Core	yes[3]
72-3c	Estuarine/marine acute invertebrate EC_{50} (mollusc)	40431601	Core	yes[2]
72-4a	Freshwater fish early life stage (fathead minnow)	00126739	Core	yes

Guideline #	Data Requirement	MRID #	Classification	Is data requirement satisfied?
72-4b	Estuarine/marine fish early life stage (sheepshead minnow)	00126739	Core	yes
72-4c	Freshwater invertebrate life cycle (daphnia)	00126738	Core	yes
72-4d	Estuarine/marine life cycle (mysid)	Not Submitted	N/A	No
72-5	Freshwater fish full life cycle	44086801	Invalid	No
81-1	Acute mammalian oral	42857001	Core	yes
83-5	Two-generation mammalian reproduction (rat)	41325401	Core	yes
123-1	Terrestrial plant testing	43848801 43848802	Core	yes
123-2	Aquatic plant acute toxicity	43848803-807 & 43414542	Core	yes
141-1	Acute honeybee oral LD50	43185001	Core	yes
141-2	Acute honeybee foliar contact	not required	N/A	no

[2] Quahog clam, *Mercernaria mercernaria*, was used in this study instead of oyster, however the guideline is considered fulfilled

[3] Grass shrimp, *Palaemonetes pugio*, was used in this study instead of mysid, however, the guideline is fulfilled